DOCUMENT RESUME

ED 102 916 HE 006 286

TITLE Postgraduate Education and Training in Public Health. Report of a WHO Expert Committee. World Health Organization Technical Report Series No. 533.
INSTITUTION World Health Organization, Geneva (Switzerland).
PUB DATE 73
NOTE 73p.; Report of the World Health Organization Expert Committee on Postgraduate Education and Training in Public Health (Geneva, Switzerland, April 25-May 1, 1973)

EDRS PRICE MF-$0.76 HC-$3.32 PLUS POSTAGE
DESCRIPTORS Graduate Study; *Higher Education; *Manpower Needs; *Medical Education; *Medical Schools; Professional Training; *Public Health; Undergraduate Study

ABSTRACT

A World Health Organization expert committee on Postgraduate Education and Training in Public Health met in Geneva from 25 April to 1 May 1973. It was vital to take a fresh look at the situation because of the far reaching changes that have occurred since 1960. There have been extensive revisions of undergraudate medical education. Major alterations have also been made in postgraduate training programs, and considerable changes have occurred in the pattern of health needs and demands and in ways in which health services are provided and managed, priorities established, and scarce resources distributed. Chapters of this document cover manpower needs in relation to postgraduate public health training; training programs in public health; institutions offering postgraduate public health training programs; the future of postgraduate training in public health; the role of associations of schools of public health; and the role of the World Health Organization in future developments. Annexes include extracts from a report on the situation of schools of public health; an outline of educational planning as related to postgraduate public health programs; and the problem-discipline matrix. (Author/PG)

Wld Hlth Org. techn. Rep. Ser., 1973, No. 533

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Report of a WHO Expert Committee

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POSTGRADUATE EDUCATION AND TRAINING IN PUBLIC HEALTH

Report a WHO Expert Committee

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GENEVA
1973

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PRINTED IN SWITZERLAND

CONTENTS

	Page
1. Background	5
2. Definitions	6
3. Manpower needs in relation to postgraduate public health training	8
4. Training programmes in public health	10
4.1 Basic postgraduate training	11
4.2 Programmes other than the basic postgraduate training programme	15
4.3 Training of teachers	16
4.4 Educational planning	17
4.5 Special needs of foreign students	19
5. Institutions offering postgraduate public health training programmes	21
5.1 Characteristics: similarities and differences	21
5.2 Functions: training, research, and service	21
5.3 Organization and administration	22
5.4 Structure	22
5.5 Teaching staff	23
5.6 Physical facilities	24
6. The foreseeable future of postgraduate training in public health	24
7. The role of associations of schools of public health	28
8. The role of WHO in future developments	29
Annex 1. Extracts from a report on the situation of schools of public health in 1971	32
Annex 2. An outline of educational planning as related to postgraduate public health programmes	60
Annex 3. The problem–discipline matrix	67

6

WHO EXPERT COMMITTEE ON POSTGRADUATE EDUCATION AND TRAINING IN PUBLIC HEALTH

Geneva, 25 April – 1 May 1973

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0 7

POSTGRADUATE EDUCATION AND TRAINING IN PUBLIC HEALTH

Report of a WHO Expert Committee

A WHO Expert Committee on Postgraduate Education and Training in Public Health met in Geneva from 25 April to 1 May 1973. The meeting was opened by Dr T. A. Lambo, Assistant Director-General, on behalf of the Director-General.

Dr Lambo recalled that although there had been many meetings to discuss different aspects of schools of public health, the last general review by an expert committee was made in 1960.[1] Because of the far-reaching changes that have occurred since then, it is vital to take a fresh look at the situation.

There have been extensive revisions of undergraduate medical education. Major alterations have also been made in postgraduate training programmes, and considerable changes have occurred in the pattern of health needs and demands and in the ways in which health services are provided and managed, priorities established, and scarce resources distributed. In addition, there has been an enormous increase in specialization in the public health field. The time has come for a reappraisal that is unconstrained by tradition and for proposals that may well have to follow new or little explored paths. Dr Lambo therefore called for a frank review of the present situation and requirements not only of schools of public health as such but of postgraduate public health education wherever it happens to be given.

1. BACKGROUND

Since its inception the World Health Organization has been helping countries in their efforts to train the health manpower needed for the development of their health services. In so doing WHO has fostered the philosophy of enriching the basic education for the health professions—including medicine—with the spirit and practice of prevention.

More pertinent to the subject of this Expert Committee, WHO has attempted to promote the postgraduate training of personnel in public health, for example, by developing the capacity of selected medical and nonmedical personnel to assess health needs, decide on national and community priorities, and develop realistic plans to meet these needs and to

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[1] *Wld Hlth Org. techn. Rep. Ser.*, 1961, No. 216.

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administer, manage, and evaluate health services. Its activities in this field range from offering a forum for technical discussions by government representatives at World Health Assemblies to the awarding of fellowships for postgraduate public health studies abroad; from sponsoring regional meetings of deans and directors of schools of public health to providing individual schools with visiting professors. They also include preparing various publications, such as the directories of schools of public health,[1] and commissioning special surveys, e.g., the recent study of the situation of schools of public health in 1971 carried out for this Committee (see Annex 1, page 32).

Of particular relevance to the deliberations of the Committee are the published reports of two earlier expert committees on the foreign student and postgraduate public health courses [2] and on recommended requirements for schools of public health.[3] The meeting of the Study Group on Special Courses for National Staff with Higher Administrative Responsibilities in the Health Services [4] and the Conference of Directors of Schools of Public Health [5] also dealt with issues pertinent to the subject under discussion.

2. DEFINITIONS

Before proceeding to substantive discussions the Committee thought it expedient to consider a number of definitions.

Public health. The Committee took note of the fact that there has been a marked change in the concept of public health since the beginning of the century. Traditional public health comprising mainly environmental health services and communicable diseases control was progressively enlarged from 1900 onwards to include personal health care services for selected groups of the population. The expression public health is now used in a broad sense to encompass the problems affecting the health of a population, the collective status of health of the people, environmental health and health services, and the administration of health care services.

Community health. This expression is now current in a number of countries. Without further qualification it is ambiguous. In some instances it is used as a synonym for environmental health to refer to health care *of* the community; on other occasions it refers to non-institutional health

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[1] *World directory of schools of public health*, 1965, Geneva, World Health Organization, 1968; *World directory of schools of public health*, 1971, Geneva, World Health Organization, 1972.

[2] *Wld Hlth Org. techn. Rep. Ser.*, 1959, No. 159,

[3] *Wld Hlth Org. techn. Rep. Ser.*, 1961, No. 216.

[4] *Wld Hlth Org. techn. Rep. Ser.*, 1965, No. 311.

[5] *Wld Hlth Org. techn. Rep. Ser.*, 1967, No. 351.

care, or health care *in* the community. It is also used to refer to the totality of health care provided *for* a community and in this sense embraces public health as defined above. In this report community health generally has this last meaning.

The health team. The gradual expansion of the sphere of public health referred to above has culminated in the present-day concept of providing health care and cognate social services for everyone, thus bringing into the health team categories of workers not represented in the traditional team. The planning and modern management of health services further enlarged the composition of the health team in these contexts. Health care is no longer considered in isolation but rather as one aspect of human welfare requiring the collaboration of sociologists, economists, specialists in administration and managerial science, social service workers, and others as members of the health team.

School of public health. While agreeing that the definition given in the 1961 report might be retained,[1] the Committee thought fit to state that a school of public health should be viewed as a functional entity whose main purpose is to provide general and specialist public health training for members of health and other professions who require it. Among the courses offered there should be a basic course leading to a postgraduate-level qualification in public health. Schools of public health may also have research responsibilities and provide direct and advisory services to the community.

Public health training. As public health practice in some countries includes personal health care services and their administration whereas in others it relates almost exclusively to sanitary and other environmental health activities, it is necessary to state that in the present context public health training is taken broadly to mean the postgraduate training required by health planners, administrators, and personnel engaged in public health services who need such competence.

Subject. As used in this report, a subject is a body of knowledge within the field of public health, e.g., public health administration, health statistics, epidemiology, environmental health.

Course. A course is a particular component (or components) of a subject, presented as a unit for instructional purposes, e.g., principles of epidemiology, introduction to vital statistics, community mental health.

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[1] "An institution with adequate resources which, in addition to research in public health and service to the community, provides a full-time course lasting not less than one academic year, or its equivalent, covering the subjects essential to the understanding of the various problems of public health and the concepts, organization and techniques required for dealing with them, and which is open to members of the medical and allied professions seeking qualification in public health" (*Wld Hlth Org. techn. Rep. Ser.*, 1961, No. 216, pp. 4–5).

Training programme. A training programme is defined as a set of courses organized for a specific educational purpose. The term *curriculum* has a similar meaning.

3. MANPOWER NEEDS IN RELATION TO POSTGRADUATE PUBLIC HEALTH TRAINING

Needs for personnel trained in public health are constantly increasing and will continue to do so in the future. Four factors are largely responsible for these growing needs:

(*a*) population growth;

(*b*) rising personal expectations for health care;

(*c*) the fact that governments are assuming greater responsibility for personal as well as community health, with the result that health care systems are becoming more oriented toward public health; and

(*d*) the rapid improvements being made in public health technology, equipment, and performance levels, which call for continuing quantitative and qualitative changes in the health manpower structure.

While the increase in public health manpower needs may be fairly obvious, the process of quantifying these needs is by no means an easy one. In the present context, this process of estimation can be considered to play a double role. First, it is one of the bases of manpower planning and hence of educational planning, inasmuch as it provides information about the volume of public health training that is likely to be demanded in the future. Second, it is itself a subject in the public health training curriculum. Both quantitative and qualitative aspects of the estimation of health manpower needs should be dealt with in courses on health planning at all levels. The courses should include projective quantitative methods as well as economic and pragmatic approaches and should draw attention to areas of conjecture and uncertainty in their use.[1] Attention should also be drawn to the ways in which manpower needs are influenced by the structure and functioning of the health care system.

As a rule, health manpower planning based on survey methods and utilization statistics is readily feasible only in countries committed to comprehensive health planning within a national development plan, and even in these countries it has not proved easy to make estimates of future manpower requirements in the public health field. Manpower needs in public health depend considerably on the type of health care system adopted

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[1] See Grundy, F. & Reinke, W. A. (1973) *Health practice research and formalized managerial methods*, Geneva, World Health Organization (*Publ. Hlth Pap.*, No. 51), p. 155.

by the country, which in turn is related to its epidemiological characteristics, level of development, and socioeconomic and political structure. The work of public health personnel is not readily related to the ascertained needs of health service utilization. Moreover, public health activities are increasingly undertaken not by individuals but by teams. The Committee recognized these and other difficulties but was nevertheless persuaded of the importance of making validated quantitative estimates of public health manpower needs.[1] It is in the interest of schools of public health to contribute to the attainment of this objective.

Basically, this involves the following steps:

(*a*) analyse the demographic/epidemiological situation;

(*b*) study the health system currently constituted and functioning (this would also include an analysis of the current pattern of manpower supply);

(*c*) analyse the health needs and demands of the population, both qualitative and quantitative, and the capacity of the community to meet these needs and demands;

(*d*) define the desired outputs in view of the foregoing analysis;

(*e*) determine the functional performance criteria and organizational configurations best able to deliver these outputs.

This process should enable countries to define the various tasks to be performed in the field of public health and to allocate them in an economical way to different and, perhaps in some cases, to new types of personnel. Education and training programmes can then be designed to equip each category of personnel with the competences needed for their assigned tasks.

In this connexion the following points need to be emphasized:

1. Health manpower planning should be part of a health development plan within the framework of an overall national plan. This is easier to ensure in countries where a comprehensive system of prospective planning has been adopted.

2. To be adequate for planning purposes, estimates of personnel requirements must include middle- and lower-level auxiliary health personnel in addition to professional personnel. Especially in countries where doctors and other university-level personnel are scarce, there is an urgent need to train auxiliaries to play a supplementary part in the health services. However, auxiliaries also play an important role in countries with greater availability of university-level personnel. The role and training

[1] From the survey of schools of public health (see Annex 1) it appeared that on the average about one doctor out of 25 is employed in public health work, and that of the 4000 doctors obtaining a public health qualification each year approximately three-quarters go into sanitary and other environmental services and the other quarter into administrative, research, and teaching posts.

requirements of health auxiliaries must be taken into account by those responsible for educational planning.

3. Physicians are not the only category of health professional to require postgraduate training in public health. This work is increasingly undertaken not by individual doctors but by teams comprising physicians, dentists, psychologists, public health nurses, social workers, dieticians, veterinarians, etc. Nonmedical professionals, such as engineers and sociologists, also require such training as members of the health team. In addition, estimates of the volume of demand for public health training must take into account the number of nonmedical planners, administrators, etc., required at different levels.

4. In view of the current integrated nature of public health activities, it is clear that educational and manpower planning must be done in terms of health teams, not only by separate personnel categories.

5. Projections of manpower requirements, even for short periods of years ahead, need to be revised at frequent intervals. Thus, health manpower planning should not be regarded as an isolated event but rather as a continuous dynamic process.

6. The Committee noted that definitive surveys of the health needs and health care tasks required for computing "norms" have been made in only a few countries. In this connexion, however, it must be remembered that norms and estimates of manpower requirements prepared in one country are not suitable for use elsewhere. On the other hand, the related methodologies, which schools of public health have helped to develop, have universal validity.

7. Schools of public health have contributed substantially to the development and testing of survey and other methods in the field of health manpower planning and should continue to do so.

8. In estimating the demand for postgraduate public health training, the provision of teachers for expanding undergraduate education in social (community) medicine should not be overlooked.[1]

9. The demand for research workers, senior health administrators, and health planners with specialist and advanced public health training is also important. Though a relatively small fraction of the medical and other professions concerned, they are clearly vital for the future development and administration of health services.

4. TRAINING PROGRAMMES IN PUBLIC HEALTH

Training programmes commonly offered by schools of public health include the basic preparation of public health practitioners, advanced

[1] According to the survey referred to earlier, 6 medical specialists in social medicine may be required for every 100 students admitted to undergraduate medical studies.

programmes and specialized studies in one or more sciences relating to public health practice, and a variety of short courses for special groups, including continuing education and refresher training.

4.1 Basic postgraduate training

4.1.1 *Objectives and curriculum*

The basic training programme for public health practitioners has undergone substantial modification since its origin in the late 1800s. Early programmes were developed in response to the stimulus of bacteriological and sanitary advances, and generally emphasized the control of communicable diseases through environmental hygiene and immunological principles. In 1960, a WHO Expert Committee[1] indicated 5 subjects considered essential for a school of public health :

(*a*) public health administration : principles and practice ;

(*b*) health statistics ;

(*c*) epidemiology ;

(*d*) environmental health ;

(*e*) microbiology.

The 1966 Conference of Directors of Schools of Public Health[2] reformulated and expanded this list to include 7 essential components :

1. biological sciences in public health, including microbiology, genetics, biochemistry, and physiology ;

2. social sciences in public health, including the behavioural sciences, economics, and political science ;

3. statistics and demography ;

4. epidemiology, including survey and research methods ;

5. environmental health ;

6. administration, legislation, planning, and evaluation in public health and medical care, including social security and health insurance ;

7. health education.

Obviously, however, the shift in emphasis and scope of public health has not proceeded at the same pace in the various schools. One reflection of this is the great diversity of basic postgraduate programmes now being offered by different institutions, as determined by the survey of schools of public health mentioned earlier. The course titles included in

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[1] *Wld Hlth Org. techn. Rep. Ser.*, 1961, No. 216.

[2] *Wld Hlth Org. techn. Rep. Ser.*, 1967, No. 351.

about half or more of the programmes were as follows (in order of decreasing frequency) : [1]

health administration and organization statistics and epidemiology environmental health and sanitation	in all schools
microbiology and parasitology maternal and child health ; school health nutrition health education	in almost all schools
occupational health mental health genetics family planning	in about half the schools

In addition, a number of institutions reported teaching :

social science
health economics
health planning
research and survey methods
managerial science

The breadth of diversity in programme content is striking. Even this list is by no means comprehensive, and there is considerable variation from one school to another in what is actually taught under a particular course heading. In general, however, as explained in Annex 1 (pages 33–35), three main types of curriculum can be discerned corresponding to different phases of the historical shift in the concept of public health. A predominantly traditional curriculum consisting mainly of courses in sanitation, communicable disease control, public health chemistry and microbiology, and vital statistics is still found in only a few schools. The majority of institutions now have a " sociomedical " curriculum, emphasizing health care administration, social services related to health, and the control of noncommunicable diseases. What may be called the " modern " multidisciplinary, managerial curriculum featuring behavioural sciences, health economics, management science, health planning, and research methodology and survey methods is at present offered by about 10 schools, although others are moving in this direction.

The historical change in the concept of public health is not the only cause of the current diversity of course offerings. Another important contributing factor is that the graduates of different schools will have to function in different communities and thus meet different local needs. These differences must be reflected in their training. Basic postgraduate education in public health cannot be uniform in all schools : one can no

[1] See Annex 1, pages 37–41, for further details.

PI 15

longer speak of a "standard" core curriculum. Instead, schools must emphasize those competences that their graduates will need to perform effectively as public health workers in the particular community they plan to serve. A suitable approach to educational planning, therefore, is to establish a set of objectives, based on local health needs and demands, that the selected courses must help the student to achieve (see pages 17–18 and Annex 2). An example of a statement of educational objectives is as follows:

1. To develop an understanding of:

   (*a*) the physical, biological, psychological, and social factors that affect the health of a community (i.e., human ecology and health);

   (*b*) relevant concepts from the appropriate social and behavioural sciences; and

   (*c*) the components and operation of health care delivery systems, including facilities and manpower.

2. To become proficient in the techniques of:

   (*a*) information collection, storage, retrieval, analysis, and dissemination; and

   (*b*) environmental forecasting, monitoring, analysis, and planned modification;

3. To acquire skill in applying these understandings and techniques to the identification and control of community health problems.

4. To develop competence in the planning, management, and evaluation of health services, including competence in decision making.

A proper statement of objectives permits the construction of an effective curriculum. Flexibility, however, is desirable. The individual student should, according to his previous experience, be able to be exempted from pursuing certain courses. He should also be permitted to take elective courses. In addition, there should be opportunities for innovation in educational methods and for interdisciplinary as well as integrated teaching (see Annexes 2 and 3).

In health services administration, managerial responsibilities will generally be borne by physicians with postgraduate training that has included management methods, and in some cases by persons with professional education in law, economics, or business management and with postgraduate training in public health. In any event, the essentials of management science must be added to those of biostatistics and epidemiology to form a broader core of public health training in quantitative analysis.

?116

The establishment and management of modern complex health care systems require a combination of health planning, health practice research,[1] and programme development, implementation, and evaluation. This implies the development of management information systems ensuring the efficient collection, processing, and analysis of relevant data. Schools of public health must be prepared to train administrators to be selective in their demands for information, to process it economically and analyse it effectively, and to utilize it efficiently in the planning, management, and evaluation of health services.

4.1.2 *Qualifications of candidates for admission*

In many schools the basic postgraduate training programme is open to candidates qualified in any of a number of health professions, e.g., medicine, veterinary medicine, dentistry, nursing, or pharmacy. This gives a certain heterogeneity to the student body and creates a diversity of special interests, which has its advantages. Student heterogeneity does, however, raise substantial teaching problems. These can be overcome to a great extent through team spirit, the provision of orientation courses, and the availability of elective courses. The fact that the required courses are of common interest is also a unifying factor. There are, however, still a considerable number of schools whose postgraduate programmes are open only to physicians.

Apart from the main requirement of having a qualification in one of the health professions, many schools select candidates on the basis of their personal record. Especially relevant is whether they have had one or more years' experience in health work after their qualification, including some practical experience in a particular health field.

4.1.3 *Degrees, diplomas, and certificates ; inter-institutional comparability*

The practice of awarding a degree, a diploma, or a certificate upon completion of a basic postgraduate training programme in public health varies according to the tradition and organizational status of the teaching institution (whether part of a university or outside it, etc.) and the prevailing pattern in the country. The degree of Master of Public Health (MPH) and the Diploma in Public Health (DPH) are the qualifications most widely awarded.

The Committee considered it unprofitable to dwell at length on the question of inter-institutional comparability of training programmes and qualifications, as this is largely a matter for individual countries or institutions interested in equivalence or reciprocity of their qualifications. The

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[1] See Grundy, F. & Reinke, W. A. (1973) *Health practice research and formalized managerial methods*, Geneva, World Health Organization (*Publ. Hlth Pap.*, No. 51).

crucial requirement is that the training programmes in a given country or region be aimed at developing the competences needed by students for dealing with the public health problems that are likely to confront them in their subsequent careers. The view was expressed, however, that some system of recognition of basic postgraduate degrees or diplomas might facilitate the movement between institutions of candidates seeking courses or supervised research projects leading to higher qualifications in public health.[1] Such a system of recognition might be based on comparison of clearly stated educational objectives.

4.2 Programmes other than the basic postgraduate training programme

Depending on the identified needs of the local health services and the possibilities of the institutions, three other types of training programmes in public health may be offered.

The first type of training is at a level more advanced than the basic. It may concentrate on a particular discipline, such as epidemiology or mental health, or it may have as its main component a research project leading to the award of a higher qualification or degree.[1] This higher-level qualification is for the selected few from among those with the basic qualification in public health who wish to prepare for higher responsibilities in public health practice, teaching, or research and thus need to obtain competence in a particular discipline beyond that which they have acquired in the basic programme.

Not all schools of public health have the resources or demand to justify providing this higher level of education. Candidates for such training are thus often obliged to seek it at an institution other than the one where they have obtained their basic public health qualification. If no arrangement exists for recognizing their basic qualifications they are apt to be required to complete, first, the basic training programme in public health. Hence the above-mentioned importance of comparability of training in certain respects and of some kind of recognition of degrees and diplomas.

The second type of training is one concentrating on a single discipline. This is suitable for candidates who do not require the basic programme in its entirety or who are not qualified to take it. Such is the case, for instance, with persons having a professional qualification in a field other than health, e.g., economists or statisticians.

The third type of training is of the nature of continuing education and of short refresher and special courses. It is intended to contribute to the lifelong education needed to keep abreast of developments and acquire additional competences. This type of education especially should always be

[1] Such higher qualifications include Doctor of Public Health, Doctor of Philosophy, and Candidate of Sciences.

oriented towards improving the performance of participants. For example, many senior administrators reach positions of major responsibility for planning and administering health services with little or no formal training in these areas. Such persons stand to benefit from short courses tailored to their specific needs. One approach that has proved successful has been to provide 2–3 months of training in methods of health practice research and management techniques, followed later by a similar period of study focused on the methods and processes of health planning. Ideally, the institutions offering such continuing education should also be prepared to provide follow-up consultation services to the course participants in their own work setting.

The first two types of training have certain formal requirements and lead to a degree or diploma. The third type of training, though of informal character, is vitally important for all levels of personnel.

4.3 Training of teachers

It is generally acknowledged that the role of a teacher calls not only for expertise in a subject but also for competence in facilitating the learning of it. Since few individuals acquire this competence naturally, it follows that it must be developed by systematic teacher training programmes. Justice could not be done at this meeting to the subject of teacher training, which has been studied in its broader aspects by a recent WHO Study Group.[1] However, the Committee was in full agreement on its importance in institutions providing postgraduate education in public health. Facilities for developing teaching competence should be made available either in the school itself or in institutions, preferably local, that specialize in improving teaching skill, and participation in these activities while not mandatory should be encouraged. Programmes to develop teaching competence are necessary not only to improve the effectiveness of the school's own teachers but also for its students, who as future public health workers will need the ability to communicate effectively with their colleagues and the general public. Also, among the students pursuing postgraduate education in public health there will be some who will become teachers of preventive and social medicine in undergraduate medical schools, in other schools for health personnel, or in the postgraduate institution itself; and they too need such training. Further, the availability of such facilities in a post-graduate institution may serve the teacher training needs of a wide range of medical and allied educational institutions in the region.

A variety of methods can be used to provide teacher training on a local and continuing basis. Some representative examples are: (*a*) regularly scheduled in-service training activities of short duration (one day to one

[1] *Wld Hlth Org. techn. Rep. Ser.*, 1973, No. 521.

19

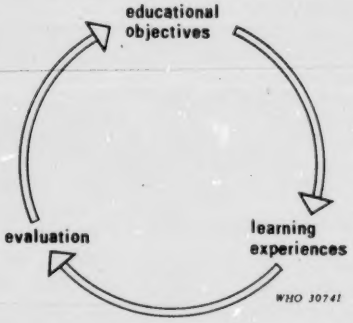
week) conducted by locally available experts in pedagogy ; (*b*) opportunities for practice teaching conducted by senior faculty members for junior colleagues and teaching assistants ; (*c*) discussions on specific educational problems with consultants in pedagogical science, e.g., on course evaluation, the development of audiovisual aids, etc. ; (*d*) peer review sessions in which colleagues observe and criticize each other's teaching performance.

More extended and formalized training can be obtained at medical teacher training centres, which now exist in many parts of the world. The network of newly developed regional teacher training centres assisted by WHO will, it is hoped, soon become more comprehensive with the addition of new national and institutional centres to meet the needs of teachers of different countries and schools of health personnel.

4.4 Educational planning

The Committee recognized the paramount importance of introducing the systems approach to educational planning in the field of postgraduate public health training. Such planning involves a cyclical decision-making process guided by a systematic approach—actually a cybernetic circle (see diagram below).

CYBERNETIC CIRCLE OF DECISION MAKING IN EDUCATIONAL PLANNING



The first step in the process is to define educational objectives. The definition of these objectives in operational terms is a subject to which schools of public health had, until recently, paid little attention. This stemmed from a failure to recognize that, although objectives may be clear to each individual member of the teaching staff, the fact that they are not stated explicitly in unambiguous terms may create an impression of agreement when in fact there is none. One reason for defining educational objectives in precise operational terms is to improve communication among

faculty members and between teachers and students on the educational aims being pursued. Another advantage of this approach is that the educational programme, instead of being the result of an unselective historical accumulation of knowledge, is shaped in terms of the aims to be achieved. If the goal is modified in the course of time, the programme too must be modified accordingly. There are many sources of educational objectives for a school of public health. The most important are the views of students and practising public health workers and analyses of the health status, needs, and resources of the society, its sociocultural characteristics, and its system of health care delivery. The definition of objectives must logically proceed from a prospective study of requirements and possibilities. It must be remembered that educational objectives, also called learning objectives, are student oriented. They do not describe what the teachers do to (with, or for) the students but rather what the student should be motivated and able to do for the population for which he will be responsible after training. These objectives will not only specify the level of knowledge expected of the student but also the attitudes and skills essential for his effectiveness as a public health worker.

Once educational objectives have been set out in practical and detailed terms it is then possible to choose the appropriate learning activities for the expected objectives. The second step in the planning procedure is thus the selection and organization of learning experiences. After their selection these activities must be arranged in an orderly way so as to reduce pointless repetition and non-essential details and to present the subject matter logically and perhaps in an integrated manner (see Annex 2). The time allocation will be such that learners have an optimum chance to reach the desired level of competence. In contrast to the traditional system where the time period allocated to study is a constant (and competence becomes a variable), the systematic approach to educational planning holds that time should be a variable and competence the constant.

In the preparation of an educational programme it is best to follow the fundamental principles of learning that have been supported by systematic research (see Annex 2). There is no " best " teaching method. A teaching method must be selected for its ability to help students attain the expected educational objectives. However, for the complex educational objectives related to the majority of tasks in the field of public health, it has been suggested that methods requiring active student participation are of great importance.

The third step in the planning procedure is to construct evaluation strategies. Evaluation consists in measuring the extent to which each of the educational objectives has been attained. It is a continuous process, based upon cooperatively developed criteria concerning changes in the learner's behaviour. While its ultimate goal is to protect society against incompetent public health workers, evaluation should also serve to provide continuous

feedback to students on their own performance, keeping them informed about their progress not only in relation to their peers but to the expected level of competence. It should also provide feedback to the staff on the efficiency of their teaching, their teaching methods, the curriculum and teaching programme, and ultimately the educational objectives themselves. The results of the evaluations thus provide a basis for regular review of the objectives. It must be remembered that there is no " best " examination technique anymore than there is a " best " teaching method. The type of examination used for evaluation must be selected for its ability to measure the criteria indicating to what extent an educational objective has been attained. One important aspect of evaluation is the assessment of the efficiency of trainees in coping with their daily tasks after graduation.

A more detailed discussion of educational planning as it relates to postgraduate public health programmes, prepared especially for the present meeting, is appended to this report (Annex 2).

4.5 Special needs of foreign students

Students who attend training programmes in countries other than their own provide special challenges for the host schools.

Schools admitting non-nationals for basic public health training do so in one of two ways :

(*a*) by placing them in the programme offered primarily to national students ; or

(*b*) by creating a special basic programme for them, generally offered in addition to the regular training programme for nationals.

The experience of those who have worked with foreign students suggests that the following areas require particular attention.

4.5.1 *Selection and preparation*

These are the most crucial steps in ensuring a productive period of study. Many factors are involved in selection and preparation, and each has the potential for seriously hampering what might otherwise be an invaluable learning experience. Language proficiency and a mature personality are absolute prerequisite for making the difficult transition into a foreign learning environment. Prior to departure the student should be assisted in defining clear educational goals and, when possible, should be given insight into the nature of the training programme and how it will help him to reach these goals. In addition, the selection and application process should take place far enough in advance to allow proper preparation of the student's home and family affairs, etc., prior to departure so that these concerns do not interfere with his adjustment to a new setting.

4.5.2 *Academic problems and orientation*

The main academic problem when foreign students are admitted to regular programmes is to modify certain parts of the programme to meet their special needs. In schools offering a wide range of elective and alternative courses the problem is largely solved by the selection of a suitable combination of courses. Orientation courses, individual tuition, and language instruction are, however, often necessary, and the provision of field experience not widely at variance with the home situation of students also requires particular attention.

The first few weeks in a different educational environment are of critical importance. It is during this period that the school must make a significant effort to orient the student and assist his adaptation to his new surroundings, professional as well as social. Procedures such as early meetings with staff, preliminary explorations of student goals, visits to available resources (library, health services, etc.), and an introduction to the social and cultural patterns of the country are essential. This period of orientation, which may span several weeks, is particularly helpful to students whose mother tongue is different from that spoken in the host country.

4.5.3 *Counselling and accommodation*

The opportunity to discuss learning and adaptation problems with a "friendly ear" is important to any student, but especially to the foreign student. Counsellors should be individuals who are competent to perform in this role and should not be selected for expertise in a particular scientific discipline. This is also a role that experience suggests should be voluntary rather than assigned. Counsellors can be drawn from a variety of sources, including staff, professional counsellors (e.g., clinical psychologists), and students. As many sources as possible should be used, since each type of counsellor has the potential for dealing most effectively with certain types of problem.

Students participating in international programmes are likely to be younger than national students, some being in their early twenties. Hostel or other residential accommodation is therefore virtually essential for them.

4.5.4 *Clarifying specific educational needs*

Nothing is more frustrating to a student than to travel thousands of miles for special studies and receive instruction that has little relevance to his particular needs or those of his country. The identification of training needs must be made prior to departure by the collection of appropriate data (including surveys, epidemiological data, etc.). At this stage, such information will be of great value to both the prospective student and the school itself in deciding on their mutual suitability. If on the basis of this information both parties decide that the venture is worth while, the student

should bring the relevant data with him and remit it to the faculty, which will facilitate the preparation of an appropriate training programme and any anticipatory readjustments needed.

5. INSTITUTIONS OFFERING POSTGRADUATE PUBLIC HEALTH TRAINING PROGRAMMES

5.1 Characteristics : similarities and differences

The survey of schools of public health (Annex 1) confirmed that all such schools that fit the definition given in section 2 engage to varying degrees in postgraduate training, in research, and in service functions in the broad field of public health. However, they differ among themselves in certain respects, e.g., with regard to the types of student admitted and their relationship to the university or medical school. Some schools admit only physicians whereas others accept other professional health-related personnel as well. Regarding their organizational status, some schools are expanded departments of preventive and social medicine in undergraduate medical faculties whereas others are autonomous independent institutions connected with universities or administered by governments (see Annex 1).

5.2 Functions : training, research, and service

There is a general consensus that the functions of a school of public health are threefold, namely training, research, and service, but that its primary responsibility is postgraduate public health training, which consists of basic, advanced, and specialized training and should also include continuing education in public health (see section 4).

Regarding service, the school of public health should have some linkage with the health services of the country, as otherwise it is apt to lose touch with reality. Giving consultancy service is mutually beneficial to the school and to the national health service.

With few exceptions schools of public health undertake a wide range of research activities both in association with their teaching responsibilities and independently of them. In some instances research projects are referred to them by government departments while in other cases they originate in the school. A recent significant development is the pursuit of investigations in the field of health practice, i.e., health practice research, whose broad purpose is to improve and provide data for the planning of health services. A few of the more advanced schools are also undertaking research programmes of a more fundamental nature in this field, such as research into the validity of investigatory methods and techniques and the refinement of statistical, epidemiological, and other research instruments. The great

volume of research, however, should be action-oriented and problem-solving rather than pure research. Research of this type in addition to its practical applications gives indispensable support in advanced teaching programmes and also provides opportunities for demonstrating the application of research methods to community health problems.

5.3 Organization and administration

Different preferences have been expressed regarding the organizational status of schools of public health. Should the school be autonomous within a university, or be a department of a university school, or should it have a linkage with the university without being a part of it? The Committee agreed that the important thing is to ensure the maintenance of university-level standards. In addition, whether part of a university or not, it is advantageous for the school to have a separate budget and control over the training programme.

Regardless of the way in which the school is administered (e.g., by a board through a dean or director), the administration should be assisted by consultative committees, including representatives of part-time teachers, health services, and students, to bring in the different viewpoints of the providers and consumers.

Schools of public health, even when not belonging to a university, can benefit greatly from close association with one, as well as with other institutions of higher education, so as to avoid duplication of facilities for occasional and limited needs. As mentioned earlier, there should be a close relationship between schools of public health and public health services of the government, which will permit the schools to play a fundamental role in the shaping of governmental health policies. Close cooperation with other schools, medical and social faculties, professional associations, industrial enterprises, and charitable bodies will also result in mutual benefit to all concerned.

5.4 Structure

Schools of public health are often structured in departments representing disciplines with both full-time and part-time teaching and other staff. In some schools the number of departments has greatly increased with the addition of more and more disciplines. Some Committee members considered this arrangement tradition-bound and felt that the structuring of staff strictly by departments has been too rigid and has not lent itself to integrated teaching and research. A novel pattern was suggested based on a matrix organization representing four or five major areas of knowledge. The idea is to set up task forces or problem-solving groups on a semi-permanent basis from these different disciplines to undertake specified

research or training activities (see Annex 3). With this system is is hoped that each staff member will feel allegiance not only to a particular discipline but to the problem-oriented group with whom he has to work. However, the view was expressed by some other members of the Committee that the same purpose could be served by locating the staff members as usual in individual departments but creating interdisciplinary working groups as and when needed.

The point was also made that owing to a paucity of resources it is not always possible for schools of public health to have staff representation from all public health disciplines. Such schools might develop only major or key departments and entrust the remaining disciplines to outside institutions or health units, the heads of which could be given a staff appointment in the school. This would promote cooperation and integration between different institutions.

5.5 Teaching staff

In all but the smallest schools, the academic staff of a teaching department (wherever it exists in this form) usually includes a departmental head or professor responsible for the teaching of a single subject, readers, senior lecturers, tutors, and the necessary supporting laboratory and other technicians. The importance of the school librarian, documentation clerks, and computer programmers as well as audiovisual laboratory technicians and other types of technical assistants should not be underestimated.

It was generally agreed that a full-time staff of adequate size working mainly within the school is essential for implementing effective teaching programmes, and especially for establishing and maintaining a continuing student–teacher partnership.

Part-time teachers, who are usually recruited from ministries, health departments, and other university departments, are best used for presenting circumscribed topics in which they have specialist experience. They are also valuable, as are visiting professors and other persons of eminence, for conducting seminars and discussion groups.

For teaching such subjects as economics, sociology, and psychology, sometimes the only practical course for smaller schools of public health is to use lecturers attached to university departments. This system is not wholly satisfactory as it is not easy to control the course content and method of presentation.

It is important that the proper weight be given to teaching competence when staff appointments are made. It is also valuable for all senior teachers to have a broad public health outlook besides competence in their specialty.

In addition to teachers who combine specialization in some branch of public health with an experience of other disciplines, there is a place on

the teaching staff for public health generalists who need not necessarily have high academic qualifications.

The use of audiovisual aids can be an economical way of allowing students to benefit from dispersed expertise. The same aids might also be of great use in continuing education programmes for public health practitioners.

5.6 Physical facilities

It is desirable for a school of public health to have premises containing an adequate number of lecture theatres, laboratories, seminar rooms, library, and administrative offices, together with the usual amenities for staff and students.

A technical department for the preparation of visual and other teaching material can serve to increase teaching efficiency while at the same time reducing routine chores that would otherwise have to be undertaken by the teachers themselves. Schools of public health should also have access if possible to computer facilities.

In addition to the provision of suitable facilities for the school itself, proper attention must be paid to the use of rural and urban practice areas and to the availability of adequate physical facilities for the staff working in these areas. The staff may have to be provided with residential accommodation and with facilities for rendering comprehensive health service to the communities under their care as well as for carrying out research in the community. The director of such practice areas should have a fair degree of autonomy and an adequate budget and staff to discharge his functions properly.

Schools of public health should avoid being insulated from the community; there should be ever greater concern with the solution of health problems in the field and with the testing in the community of hypotheses developed in the institutes. This will further provide opportunities for students to learn by active participation in multidisciplinary service and research activities or in *ad hoc* problem-solving exercises under the guidance of faculty instructors.

6. THE FORESEEABLE FUTURE OF POSTGRADUATE TRAINING IN PUBLIC HEALTH

Radical revisions are needed—and are already underway—in the whole system of health personnel education, including the subsystem of postgraduate training in public health, to improve the capability of trainees to cope with the present and future health needs and demands of the society they are going to serve.

In view of the changes that have occurred since the establishment of the first schools of public health, the following conclusions can be drawn about likely future developments:

1. There will be a growing demand for postgraduate education in public health by physicians who need qualifications for leadership and specialized technical functions in the health services and for health planning, management, and evaluation. Likewise, postgraduate training in public health will be increasingly required for the many other health professionals and personnel in other professions (managers, economists, sociologists, etc.) needed to fill key high-level posts in the public health services (comprising environmental health, disease control, institutional care, and personal health care).

2. Undergraduate education in the medical and allied health professions will include an ever greater exposure to the concepts, knowledge, and practical experience of health promotion and disease prevention as well as the sciences basic to public health (e.g., epidemiology, biostatistics, psychology, sociology), and will be increasingly concerned with community health, social welfare, and team work in health practice. This will profoundly influence basic postgraduate public health education, since a part of what is now postgraduate training will have been given at the undergraduate level.

3. Provisions for the training of middle-level health auxiliaries, who are extending the coverage and productivity of professional-level health personnel, will continue to expand. Their training will give greater attention to health promotion, disease control, public health, and team structures and functions, and there will be a corresponding redistribution of responsibilities. Auxiliary personnel will increasingly perform tasks now undertaken by professional personnel not only in areas where an acute shortage of professional personnel exists but also in affluent, developed areas, where demands for health care often outstrip the means of satisfying them. Institutions offering primarily postgraduate public health training will probably contribute considerably to the training of these health auxiliaries.

4. It is unlikely that the establishment of new schools of public health of the traditional institutional type will be proposed. At the same time, departments of preventive and social medicine in undergraduate medical schools, other health personnel schools, and more particularly the university centres for health sciences that are now being developed will take on a greater share of the responsibility for postgraduate education in public health, thereby helping to meet the exponentially increasing demand on institutions offering mainly postgraduate training. In this way public health education at all levels (basic and post-basic) and for all categories of health personnel will tend to become an integrated whole. Of course, since they reflect local needs and circumstances, public health educational systems—

like general educational systems—will necessarily differ greatly from one country to another. It seems clear, however, that the distinction between undergraduate and postgraduate training institutions is likely to become blurred and perhaps ultimately to disappear.

5. Sound educational planning will lead to the development of postgraduate public health curricula that are specifically directed towards objectives formulated in terms of the competences that the graduates will require in order to deal effectively with the health needs of their community.

6. A progressive transition from the traditional type of basic training programme to the modern multidisciplinary curriculum still offered by only a few schools is likely to occur everywhere, usually through an intermediate stage emphasizing a sociomedical approach (see page 12 or for greater detail see Annex 1, pages 33–35).

7. The liberation of teaching from the straightjacket of rigid didacticism is already taking place to some extent in most schools and it can be expected that this process will become generalized as educational methods based on active learner participation are progressively introduced. The need for a comprehensive, integrated, and multidisciplinary team approach to community health problems will increasingly be met through integrated teaching programmes for multidisciplinary groups of learners, which will consist largely of problem-solving exercises conducted on a team basis. Concomitant with these developments will be the widespread adoption of educational methods that facilitate the achievement of complex but clearly defined educational objectives, including competence in problem identification, problem solving, and decision making, and, equally important, a capability for critical, constructive thinking. These methods will take the form of group discussions, seminars, workshops, role playing, case studies, supervised research projects, and the use of simulation models, with or without computers, permitting active student participation. There will also be a further increase in the range of elective and alternative courses offered by schools within the basic curriculum; and, ultimately, most institutions can be expected to develop individual learning systems [1] or curricula tailored to meet individual students' needs, which are already offered in a few schools.

8. To the extent that postgraduate training programmes no longer need to cover elementary aspects of public health because of their inclusion in undergraduate training (see item 2 above), schools will be able to divert more attention to other subjects in the basic postgraduate curriculum and to advanced courses for specialized training and continuing education. The demand for leadership in improved health care delivery will find proper emphasis in the curriculum. Continuous evaluation of education,

[1] See *Wld Hlth Org. techn. Rep. Ser.*, 1972, No. 489.

including an assessment of the effect of the educational process on the graduate's efficiency, will likewise contribute to more effective training through adjustments of the curricula.

9. To meet the increasing demand for teaching staff in a wide range of health personnel training institutions, schools offering postgraduate education in public health will be led to expand their provision of courses for the preparation of teachers in public health and preventive and curative medicine. The objectives of such courses will include both mastery of the subject matter and competence in educational planning and methodology.

10. Institutions offering postgraduate education in public health will find it profitable to reach agreement about the subjects in which each might offer advanced and specialized training, both for specialists in different branches of public health (e.g., epidemiology, biostatistics, health administration) and for public health generalists, with the choice depending largely on the schools' capabilities and location. This will lead to a wider range of opportunities for advanced and specialized education and a more rational distribution of subjects among schools. On the foundations laid by basic training, such advanced and specialized education—together with supervised field experience, in-service training, and residency-type training by arrangement with health services in close cooperation with the school —should make for a level of specialization in public health comparable to that in other medical specialties.

11. Schools providing postgraduate public health education will become increasingly involved in assessing health problems and manpower needs, evaluating services, and devising more effective methods of planning, managing, and evaluating health care delivery systems. They will undertake these activities both for their own research and information needs and in a consultative capacity for health authorities. In this connexion they will find it advantageous to cooperate more and more closely with health authorities and health service units, either in their own country or in countries with different health and socioeconomic conditions, sometimes even by assuming full responsibility for health services in a defined area. Such arrangements will be mutually beneficial to the two parties concerned. While bringing to bear their academic and research competences on the solution of local health problems, the schools will benefit by having their educational programmes strengthened through field experience. Field practice may in fact become the single most important learning activity for achieving educational objectives related to local health needs and demands.

12. The familiar epidemiological and demographic situation of the developing countries, together with their limited budgetary resources and acute scarcity of trained manpower, has created special, urgent requirements in relation to public health education in these countries. First,

sanitation, the control of communicable diseases, and nutritional science will, as a rule, have to continue to occupy a central place in public health training for some time to come. This means that the introduction of the modern managerial curriculum is more important for the future than for meeting immediate requirements. Next, because the provision of primary personal and community health care for rural populations—commonly amounting to 80% of the total population in these countries—has a very high priority, doctors will have to be given a more comprehensive training in public health than is usual at the undergraduate level on the assumption that most of them will enter the basic care services, where they must have broad professional competence in this aspect of health. Third, as was stressed earlier, the situation in the developing countries requires the training of large numbers of medical auxiliaries and other middle-level health personnel. Some ways in which these training needs might be met in the future were mentioned in item 3 above.

7. THE ROLE OF ASSOCIATIONS OF SCHOOLS OF PUBLIC HEALTH

The Committee noted that there are now four associations of schools of public health of differing sizes and organizational structures covering all areas of the world, i.e., North America, Latin America, Europe, and countries in the African, Eastern Mediterranean, South-East Asian, and Western Pacific Regions of WHO. These associations provide a vast array of educational, research, and community service programmes. Their objectives include the formulation of ways of improving education and training ; the encouragement of research in public health ; the establishment of professional relations with cognate schools and institutes ; and the promotion of exchanges of staff, students, teaching material, and information among member institutions. Because they are regional in nature, such associations provide an arena for the consideration of matters of common interest. Their regional nature also means that they are not too large to attend to the concerns of a single institution.

Associations of schools of public health can contribute to the future development of schools of public health in several important ways. First, since their combined resources transcend those of single institutions, each school may draw on strengths greater than its own. Second, they offer a forum in which the most promising directions for future development may be discussed and planned. Third, they can serve to encourage and protect innovations by individual schools.

Beyond their regional role, the four associations of schools of public health have opportunities for exchanging information and new ideas among themselves, engaging in joint planning, and discussing concepts that

31

might become the basis of joint policy statements for adoption by individual institutions. The nature of some of the advantages of this kind of broader union has been described in the report of the 1966 Conference of Directors of Schools of Public Health.[1] The Committee noted that some initial steps have been taken to establish a world federation of associations of schools of public health.

It may be mentioned that there are other professional associations, for example, those based on disciplines or groupings of teachers of various public health subjects or teaching programmes (e.g., training programmes in health services administration) that might have a contribution to make to the aims and activities of associations of schools of public health.

8. THE ROLE OF WHO IN FUTURE DEVELOPMENTS

The expansion of health services, and their increasing costs in terms of material and human resources, requires personnel with the competence to assess health needs, determine priorities, propose possible solutions, and implement the resulting decisions by planning and administering health programmes and services. For such functions it will be necessary to train not only personnel in the traditional health professions but also specialists in such fields as information science, economic and social planning and management.

WHO could make a great contribution to this goal (*a*) by providing assistance to existing postgraduate-level institutions for public health education such as schools of public health and health profession schools, and (*b*) by promoting the establishment of new institutions, committed to innovation and bold approaches, that might serve as true national and/or regional centres for health development. Such institutions could play an active part in the overall process of health manpower planning, integrating its educational components into long-term projections for social and economic development. The Committee noted that assistance given by WHO in the past has included the provision of an acting dean or director to new schools during their early formative period ; fellowships for basic postgraduate and advanced health training abroad for selected graduate students, who then return to work under expatriate or national professors until they are ready to assume senior academic positions ; the provision of temporary professorial staff in fields such as administration, epidemiology, and biostatistics until such time as permanent appointments can be made nationally ; and the supply of specialists to act as visiting teachers. Actions of this kind should also encourage cooperation among schools of public health and help them remain in the mainstream of contemporary health developments.

[1] *Wld Hlth Org. techn. Rep. Ser.*, 1967, No. 351.

WHO assistance to the development of appropriate facilities for postgraduate public health education should reflect the fact that such studies are best organized and pursued on a regional basis. It is of course recognized that in many scientific disciplines education is largely independent of the location of the educational institution providing it and the conditions prevailing in the immediate environment. It is also understood that conditions characteristic of certain developing countries may be found in some areas of countries that are usually considered as developed. However, it has been stressed more than once by the World Health Assembly that studies under WHO fellowship auspices should preferably be pursued in institutions located where the ecological, sociocultural, and health conditions are most relevant to the subject of study. Especially in the field of public health this would usually mean a training institution in the home country or a country at a similar level of development. The Committee shares this point of view and urges that it be taken into account as far as practicable in the administration of the fellowship programme.

WHO might encourage the four existing associations of schools of public health to identify areas of common concern that could form the basis of a World Federation, particularly by supporting conferences of directors of schools of public health such as that held in 1966.[1]

WHO could also promote the future development of public health training by convening meetings of experts to discuss circumscribed topics. The Committee proposed the following subjects for future consideration:

(*a*) public health training as related to manpower needs and development, with special reference to the less developed countries (including the establishment and development of basic and advanced training facilities);

(*b*) the planning, management, and evaluation of health services in postgraduate public health training;

(*c*) behavioural objectives, curriculum construction, and evaluation in relation to public health training programmes;

(*d*) the training of specialists in occupational health;

(*e*) mental health in postgraduate public health training;

(*f*) environmental health in the basic postgraduate curriculum;

(*g*) basic planning and the implementation of health plans as subjects in the basic postgraduate curriculum;

(*h*) research as an aspect of postgraduate public health training and as an integral part of the activities of institutions providing postgraduate education in public health, with particular reference to the various types of investigation and subjects of possible study.

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[1] *Wld Hlth Org. techn. Rep. Ser.*, 1967, No. 351.

ACKNOWLEDGEMENTS

The Committee acknowledges the special contributions made during its deliberations by the following WHO staff members: Dr R. H. O. Bannerman, Chief Medical Officer for Education in Family Health, Division of Health Manpower Development, WHO, Geneva, Switzerland; Dr A. C. Eberwein, Chief, Public Health Administration, WHO Regional Office for Europe, Copenhagen, Denmark; Dr D. Flahault, Chief Medical Officer for Training of Auxiliary Personnel, Division of Health Manpower Development, WHO, Geneva, Switzerland; Dr J. J. Guilbert, Chief Medical Officer for Educational Planning, Division of Health Manpower Development, WHO, Geneva, Switzerland; Dr D. Koch-Weser, Division of Health Manpower Development, WHO, Geneva, Switzerland (*Consultant*); Dr X. G. Kondakis, Regional Adviser, Health Manpower Development, WHO Regional Office for Africa, Brazzaville, Congo; and Dr A. Mejía, Chief Medical Officer for Health Manpower Planning, Division of Health Manpower Development, WHO, Geneva, Switzerland.

Annex 1

EXTRACTS FROM A REPORT ON THE SITUATION OF SCHOOLS OF PUBLIC HEALTH IN 1971, WITH SPECIAL REFERENCE TO BASIC POSTGRADUATE PUBLIC HEALTH EDUCATION

The following extracts are taken from the report of a special survey on schools of public health carried out in preparation for the Expert Committee meeting.[1] The study, essentially a fact-finding investigation,[2] was directed in particular to basic postgraduate programmes for physicians. In the first phase of the survey, 119 schools were sent a questionnaire on their current programme leading to a basic degree, diploma, or certificate in general public health ; of these schools 63 responded.

In the second phase of the inquiry, short-term consultants visited and reported on the 15 schools of public health in the African, Eastern Mediterranean, and Western Pacific Regions of WHO. Their reports, together with the information contained in the WHO monograph, *The teaching of public health in Europe*,[3] provided a more detailed picture of the state of public health education in the four WHO Regions involved.

It should be borne in mind that the expressions " school of public health ", " subject ", " course " and " training programme " as used in the following excerpts carry the definitions given in section 2 of the present report.

I. PUBLIC HEALTH TRAINING PROGRAMMES AND ALLIED CONSIDERATIONS

Factors influencing the character and content of curricula

It is self-evident that public health training at any particular place and time should be intimately related to the needs and demands of society, its structure and institutions, its level of development, and its political and educational philosophy. These factors explain in large measure the considerable differences among basic training courses—and for that matter other courses—in different parts of the world at the present time.

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[1] Grundy, F. (1973) *The situation of schools of public health in 1971, with special reference to basic postgraduate public health education* (unpublished WHO document HMD/EC/73.3).

[2] The study design, prepared by a consultant group, is annexed to the report of the survey (see f. n. 1).

[3] Cottrell, J. D. et al. (1969) *The teaching of public health in Europe*, Geneva, World Health Organization (*Monograph Series*, No. 58).

Historically, during the century or so that schools of public health have prepared students for careers in health services, their programmes have needed frequent revisions to keep them in line with prevailing conditions and the progressive enlargement of health services.

Initially, the main emphasis in preparing the physician for a public health career was on the physical and biological environment. At this stage of development—the age of environmental hygiene—sanitation, housing, the control of communicable diseases, simple vital statistics, and public health law, supported by microbiology and sanitary chemistry, were the main elements of a curriculum that can conveniently be called " traditional ". The health officer was at this time an all-purpose functionary charged with making decisions and taking actions largely on his own and not uncommonly himself performing much of the laboratory work his office then required.

From 1900 onwards, maternal and child health (MCH), school health, the control of certain mass diseases, and, somewhat later (in some instances), the administration of hospitals were added to his responsibilities. The era of social welfare and organized personal health services had come ; the health officer was becoming an administrator; new subjects were introduced into his training. By 1965, social welfare, the control of noncommunicable diseases, and health service administration appeared in what might be styled the " sociomedical " curriculum, although as late as 1960 " traditional " general public health curricula comprising mainly five major subjects—organizational subjects, environmental health, microbiology, health statistics, and epidemiology—were still the rule.[1]

During the 1960s especially, as personal health services became increasingly a part of wider social provisions—and consequently more highly organized and more evidently related to the national economy—not only did the sociomedical concept mature but there were developments of a new type. It became customary to plan health services as a part of developmental or socioeconomic planning. The costs and benefits of health programmes became important considerations in policy decisions. It became the practice to use formal surveys and other investigations as a basis for defining the health situation and also to employ relatively sophisticated methods for evaluating the efficiency and results of the services provided. Formalized techniques already used in industry and other fields began to be applied to the management of health services. Public health practice, originally a comprehensive speciality, had become an aggregate of specialities such as health planning, health administration, hospital administration, health statistics, and epidemiology. The senior health administrator had by this time become in large measure a party to a multidisciplinary endeavour involving planners, sociologists, economists,and members

[1] See *Wld Hlth Org. techn. Rep. Ser.*, 1961, No. 216.

of other nonmedical professions. The clinician, who had worked largely on his own in earlier times, was becoming a key figure in a health team in which his main functions were increasingly interpretive and directorial. The operational health officer, too, was assuming managerial responsibilities, since health centres, laboratories, and the clinical-pathological units of hospitals had to be managed at the executive as well as the administrative level. This sketchy outline is of course an oversimplification but it points to certain obvious trends constituing a third stage in the evolution of basic public health training. The behavioural and managerial sciences and health planning, and research methods, as well as the biomedical sciences, were now the main subjects on which a managerial, multidisciplinary curriculum—called for brevity the "modern" curriculum—had to be based.

The process of curriculum revision was not, however, geographically uniform, with the result that courses at different stages of development—the "traditional", the "sociomedical", and the "modern"—co-exist not only in various parts of the world but often also in different schools in the same country.

In brief, it can be said that by 1971 the great majority of schools were operating curricula of the sociomedical type, with only a handful adhering for various reasons to a predominantly traditional curriculum, and a few schools had by this time introduced a modern-type curriculum with a somewhat larger number on the way to doing so.

The diversity of basic training programmes is also largely attributable to the recognition that the range of specialization now demanded in the public health field can no longer be accommodated within a course lasting for only one academic year (or its equivalent). In other words, it is no longer feasible to present specialized aspects of public health in sufficient depth in the general basic curriculum. The present-day basic programme thus has broadly a twofold purpose:

(*a*) to train a relatively large number of generalists with accommodation for a certain amount of specialization;

(*b*) to provide a basis for the subsequent special training of a smaller number of senior health administrators, health statisticians, epidemiologists, health planners, teachers, and research workers, on the assumption that they will later pursue advanced courses.

As a result, many schools have abandoned a basic curriculum that is identical for all students. The 1961 report noted that in a number of schools a distinction was made between the core curriculum comprising courses that were obligatory for every student, and elective courses that the student chose and pursued in some depth as part of the general programme. The variety of electives and alternatives now offered is discussed below (page 43), but it is worth observing here that by 1971 only one school in

three was offering a single fixed curriculum for all students. For most schools, indeed, it is more appropriate to speak of a range of curricula than of *the* curriculum ; and many of the current differences between the basic curricula in different schools are attributable in large measure to the extent to which electives are offered, as well as to the stage of curriculum development they have reached.

There are, of course, a variety of other factors influencing the detailed structure of a curriculum. The presence of a particular subject and the emphasis it is given commonly reflect the prevailing situation, national priority decisions and the local nature of health service provisions. Environmental health, for instance, is given a prominence commensurate with its importance in the particular country or area. A detailed technical knowledge of water supplies and sanitation is necessary in some countries but would be superfluous in others where these matters are now largely in the hands of nonmedical specialists. Likewise, bench work in the chemistry and bacteriology of water, wastes, and foodstuffs is still essential in some countries but has ceased to be so in countries serviced by a chain of bacteriological and analytical laboratories. And, negatively, since as a rule only limited teaching provisions can be made in anticipation of future requirements, subjects such as mental health and electronic data processing cannot be expected to command the same attention in countries at different levels of development.

The depth or level at which a subject should be presented is also largely determined by the professional maturity of students. There are, for instance, many subjects in the basic curriculum for which a background knowledge and an acquaintance with the methods and techniques employed in problem solving is sufficient, others in which a competence to assess the approaches and conclusions of specialists in other fields is needed, and yet others in which the public health officer must possess specialist knowledge and skills. The category into which any particular subject falls clearly varies with the situation in which the public health officer will practice. Be this as it may, it is now generally accepted that the basic training programme should, *inter alia*, provide :

(*a*) a thorough knowledge of the scientific method and its applications in problem solving ;

(*b*) a sufficient competence in mathematics (including statistical methods) ;

(*c*) a sufficient awareness of the competences available in disciplines cognate to public health (e.g., sociology, economics, planning) and an attitude of mind that would encourage interdisciplinary collaboration.

It should also make the student explicitly aware of contemporary lines of scientific progress and social evolution and direct his attention to the

kind of society and services that might be expected in the foreseeable future.

Curricula that satisfy these conditions have a more fundamental basis of scientific and sociological principles than has been usual in the past and demand a greater competence in mathematics than has hitherto been common.

Finally, the level of general and professional education that can be assumed for students admitted to the public health training programme obviously must also be taken into account in formulating the postgraduate curriculum. Three points can be commented on in this connexion:

1. The level of knowledge of public health possessed by entering postgraduate students does not appear to have influenced the content of the postgraduate curriculum appreciably. As the attention given to sanitary hygiene, organizational subjects, statistical and epidemiological methods, and the behavioural sciences varies widely in different undergraduate medical schools, a uniform level of knowledge and competence cannot be assumed among entrants drawn from many schools. Moreover, the approach to these subjects at the undergraduate level, where their main purpose is to improve the competence of doctors in health care practice, differs fundamentally from the approach involving the technical and community aspects of health care required by the public health officer. In any event, the practice is to introduce these subjects afresh in the basic postgraduate programme, and not to gear the content and level to what has gone before.

2. Broadly speaking, undergraduate medical education throughout the world is sufficient to ensure a reasonable competence in personal medical care and to provide an adequate clinical pathological basis for postgraduate public health studies. Consequently, in the basic public health course for physicians [1] clinical instruction is usually limited to a deeper exposure to special fields such as psychiatry and family planning, to the microbiological and parasitic diseases prevalent in some countries, and to recapitulations preliminary to statistical epidemiological studies.

3. Much postgraduate training time might be freed for other purposes if an adequate previous education in certain areas could be assumed. Social science, for instance, is now taught in many undergraduate schools but until the practice is general this subject must be considered as a necessary element of postgraduate training. Likewise, any lack of adequate exposure to the scientific method or of familiarity with rigorous scientific thinking in premedical and undergraduate education has to be remedied at the postgraduate level. In short, though generally adequate, there are still areas

[1] The special problems posed by nonphysicians are mentioned later (pages 52–53).

in earlier education whose deficiencies require remedial work, which imposes substantial burdens on postgraduate training programmes.

General content and structure of curricula

It may be remarked in the first place that the detailed content of basic curricula and their changes—or constancy—over a period of years cannot be identified or interpreted with certainty from replies to questionnaires, school prospectuses, and other published data alone. Course headings have different meanings in different schools and new topics are often introduced without corresponding amendments of descriptive titles. It follows that nothing short of an extended study in the schools themselves can elucidate the detailed content of a curriculum. Secondly, any classification or ordering of the hundred and more course headings that appear in prospectuses is necessarily somewhat arbitrary.

It should be understood when reading Table 1 that only a proportion of the topics included under course headings would appear in the syllabus of any one school, i.e., the lists in the table are aggregated lists. Also, as will be apparent, many of the topics listed *under* course headings often appear as separate courses.

TABLE 1. THE COURSE CONTENT OF CURRICULA

Course headings and topics included under them	Proportion of basic curricula in which course is represented
1. HEALTH ADMINISTRATION AND ORGANIZATION Public health (PH) practice. Principles and practice. Organization of medical care services. Health sociology. Social services. Social security. Principles and methods of social work. Management methods. Operations research. Health planning. Health manpower. Health economics. PH law. Health legislation. The health professions. History of PH. International health. Comparative PH. Health education. MCH services. Population growth and family planning. Hospital administration. Personal health care services. Laboratory services. Ambulance services. PH nursing. Regional health services. Occupational health. Mental health services. Care of special risk groups. Computers in health services.	In all
2. STATISTICS AND EPIDEMIOLOGY Methods and principles. Health statistics. Demography. Survey methods. Research methodology. Electronic data processing and its application. Information science. Specific epidemiologies of communicable and noncommunicable diseases (including nutrition, mental disorders, genetic disorders). Disease control.	In all
3. ENVIRONMENTAL HEALTH AND SANITATION Water supplies. Sewage and refuse disposal. PH engineering. Food hygiene. Soil hygiene. Pollution control. Noise control. Meat inspection. Housing and town planning. Port health. Occupational health. Hospital hygiene. School hygiene. Factory hygiene. Sanitary chemistry. PH chemistry. Geology. Human ecology (host, agent, and environment). The zoonoses. Sanitary law. Ionizing radiation. Nutrition. Food and drugs registration. Recreation. Migrant problems. Applied physiology (lighting, heating, and ventilation).	In all

AP40

TABLE 1. THE COURSE CONTENT OF CURRICULA (*continued*)

Course headings and topics included under them	Proportion of basic curricula in which course is represented
4. MICROBIOLOGY AND PARASITOLOGY Bacteriology. Virology. Immunology and biological products. Medical helminthology, protozoology, parasitology, and entomology.	In almost all
5. MCH AND SCHOOL HEALTH Social paediatrics. Biometry. Case of the handicapped child.	In almost all
6. NUTRITION Principles of the physiology and biochemistry of clinical nutrition. PH aspects of nutrition. Laboratory methods. Dietary and nutritional surveys. Social aspects of food hygiene. Food toxicology. Meat inspection. Hospital dietetics.	In almost all
7. HEALTH EDUCATION Psychosocial concepts. Opportunities, methods, and media. Specific applications. Evaluation and research.	In almost all
8. OCCUPATIONAL HEALTH Principles. Occupational diseases. Industrial health—applied physiology. Industrial toxicology. Ergometrics. Industrial accidents. Occupational health services. Social security. Invalidity. Rehabilitation. Labour law.	In about half the curricula
9. MENTAL HEALTH Human psychology. Social psychology. Environmental psychology. Mental disorders. Subnormality. Psychological medicine. Community mental health. Psychiatric services. Forensic psychiatry. Alcoholism. Drug dependence.	In half the curricula
10. GENETICS Molecular biology. Medical genetics. Population genetics. Genetic counselling.	In about half the curricula
11. FAMILY PLANNING	In about half the curricula
12. SUBJECTS CHARACTERIZING THE "MODERN" CURRICULUM (a) Social science (and other behavioural sciences) (b) Health economics (c) Health planning (d) Research and survey methods (e) Management science	Variously in $^1/_8$–$^1/_3$ of the curricula
13. CLINICAL INFECTIOUS DISEASES	In only a few curricula
14. TROPICAL MEDICINE, TROPICAL PUBLIC HEALTH, TROPICAL HYGIENE	In only a few curricula
15. MISCELLANEOUS SPECIAL TOPICS Human anatomy and physiology for nonphysicians. Applied anatomy (in relation to tropical medicine). Biochemistry. Human pathology. Human ecology. Pharmacology. Toxicology. Nosology and classification systems. Drug dependence. Climatology. Radiation medicine. General hygiene. Army medicine. Naval medicine. Social civil defence. Disaster relief. Travel medicine. Health and road traffic. Accidents. Veterinary hygiene. Geriatrics. Student health. Legal medicine. Medical ethics. Health certification procedures. Sports selection. Pedagogy. Hospital dietetics. Voluntary agencies. Integrated care of women. Chronic diseases and their control.	In one or, at most, a few curricula as specific titles

OP 41

The following general conclusions can be drawn from Table 1 and the source material on which it is based:

1. There is no uniformity of terminology, and consequently it cannot be assumed that a particular heading denotes the same course or subject coverage in different schools.

2. Health administration (and organization), environmental health (sanitation), and to a lesser degree statistics and epidemiology are used in some schools as umbrella headings covering subjects that are presented in other schools under specific titles. For example, in some syllabuses health planning and management science, health education, hospital administration, school health, public health law, public health nursing, rural health, social security, etc., appear under health administration; food hygiene, the zoonoses, ionizing radiation, etc., under environmental health; research and survey methods, disease control, genetics, and electronic data processing under statistics and epidemiology; whereas in other schools they appear as separate headings. It therefore cannot be concluded from the absence of a course heading that the subject is not represented in the curriculum.

3. Health administration (organization), statistics and epidemiology, and environmental health (sanitation) appear as course headings in every school syllabus. Microbiology and parasitology, MCH, nutrition, and health education are course headings in almost every curriculum. In a few schools, however, "microbiology", and, somewhat remarkably, "nutrition" are not included as subjects in the curriculum.

4. Many subjects with a specific heading are often not represented exclusively under that heading. For example:

(*a*) aspects of mental health may appear under administration, epidemiology, the behavioural sciences, genetics, occupational health, and school health;

(*b*) aspects of nutrition may be dealt with under epidemiology, environmental health, MCH, and school health;

(*c*) community health often embraces aspects of MCH, family planning, rural health, nutrition, and field survey methods;

(*d*) aspects of health education are not infrequently included under MCH, school health, and occupational health. (In some schools health education is said to be presented entirely "in relation to specific programmes".)

5. The syllabuses of instruction in "medical care" (personal health care) and "disease control" follow a fairly uniform pattern in most schools, embracing:

(*a*) biomedical, scientific, and clinical considerations;

(*b*) community diagnostic methods and results (epidemiology and biostatistics), including the magnitude and distribution of morbidity;

(*c*) social influences and constraints on the provision of services (social medicine);

(*d*) the planning, organization, and management of services (public health practice); and

(*e*) evaluation.

(It is worth observing that in this scheme social medicine is conceived as a bridge between diagnosis at the community level and health practice.)

Subjects characterizing the modern curriculum

As shown in Table 2 in about one school in three the behavioural sciences are included in the core curriculum; and in a smaller proportion of schools, health economics, health planning, management science, and research methods are included. With few exceptions these subjects have been introduced only during the last 10 years or so, and often, as the table shows, only during the last 5 years.

TABLE 2. NUMBER OF SCHOOLS WHOSE CORE CURRICULUM INCLUDES THE SUBJECTS SHOWN

Subject	Number of schools including subject in core curriculum		
	Status in 1965	Number having added subject since 1965	Status in 1971
Behavioural sciences (including sociology and social psychology)	18	16	34
Economics (health economics)	12	7	19
Health planning	7	11	18
Research methodology and survey methods (including the scientific method, social research, and health practice research)	6	10	16
Management science (including systems analysis, operations research, and other formalized methods)	6	8	14

The typical content of the courses on some of these subjects is as follows:[1]

Sociology (and political science). Kinds of leadership. Forms of government. The political process. Characteristics of urban, rural, and industrial communities. Social and cultural consequences of progress and

[1] Based on the *World directory of schools of public health, 1965* (1968) Geneva, World Health Organization.

SP 43

rapid change. Urbanization to industrialization. Socioeconomic casualties. Sociology of handicapped and aging population groups. Social aspects of family planning.

Economics: relation to health. Principles and terminology. Economic systems. Macro-economic variables. Private and public sectors of the economy. Determinants of economic growth. Principles of accountancy and budgeting. Capital function. Financial management. The health–economy relationship. Cost/benefit. Cost/effectiveness.

Elements of health planning. Forecasting methods. Patterns of disease and health services. Health manpower planning. Norms and normatives. The demand/need problem. Hospital systems planning. Comprehensive (socioeconomic) planning. The health planning process. Regional, sectorial, and project planning. The vertical and the horizontal approaches (mass campaigns). Health planning and educational planning relationships.

Research methodology in health practice. General principles. The scientific method in terms of models. Design of experiments and surveys. The preparation of scientific papers and reprints. Ethics of research work.

Scientific management (quantitative method in administration and planning). Operations research. Systems analysis and systems design. The multidisciplinary approach. Evaluation methods. Decision making and policy formulation. Cybernetics. Electronic date processing. Simulation techniques.

Broadly speaking, it can be said that the behavioural and managerial sciences, health planning, and evaluation are now recognized by schools of public health as essential subjects in the basic training curriculum. The introduction or development of courses on these subjects has, however, been delayed or deferred in the majority of schools for a variety of practical reasons. In some instances it has been decided that their introduction at present would be premature in relation to the country's level of development and other priority claims in the training programme. In other cases the main obstacle to their introduction has been a lack of teaching competence or other necessary resources. There is, in fact, an almost universal shortage of teachers who are able to deal adequately with formalized management methods and research methodology at advanced levels; there are few if any textbooks on these subjects that are suitable for the postgraduate public health student; the adaptation and validation for use in the health fields of models and analytical techniques employed in industry and elsewhere is still at an early stage. Also, in many countries there is often little awareness at governmental levels of the potential usefulness of these approaches in the health field, and consequently little demand that they be taught in basic training programmes.

44

Required hours

As reported by the schools, the number of required hours (or credit units expressed as hours) for the basic training programme ranges from 312 to 3432. For the majority of schools (46) the range is 600–999 hours; for 28 schools 600 hours or less are required and for 14 schools 1000 hours or more. For some schools the stated total relates only to hours of formal instruction in the training syllabus, while for others the time devoted to field work and practical exercises is included. Moreover, required in-service experience is taken into account to a varying extent, and time spent on the preparation of dissertations and home exercise—sometimes substantial—is not as a rule included in the totals. For these reasons the quoted figures, and especially the extreme differences shown, must be interpreted with considerable reserve.

It proved virtually impossible to compute the number of hours devoted to each of the many subjects in the curriculum. As mentioned earlier, the topics included under particular course headings vary considerably from school to school and many are represented under more than one heading. The situation is further complicated by the presence in most schools of elective and alternative courses and in many by the increasing use of discursive teaching methods, which do not lend themselves to an estimation of teaching hours under specific subject headings.

Two general conclusions can, however, be drawn from the source material.

1. The sort of allocation of teaching hours commonly found in core curricula is as follows:

Public health administration and organization Statistics and epidemiology Environmental health	Allocated roughly equal numbers of teaching hours; together account for about half the total teaching time
Microbiology and parasitology MCH Occupational health Nutrition	Together account for another third of the total teaching time
Other subjects	Account for the remaining sixth of the teaching time

2. Formal lectures and discursive sessions, on the one hand, and laboratory work, field exercises, and routine exercises, on the other hand, each occupy about one-half of the total programme time.

Generally, although statements of the number of required hours may be useful in individual schools for purposes of academic administration, there appear to be serious limitations to the use of such figures as a basis for comparing the course contents of different schools or as an external measure

of curriculum revision. The time may be opportune to ask if the publishing of catalogues of required hours on a regional or world scale has not become a somewhat sterile exercise.

Elective courses in the curriculum

By 1971 only 39 schools (i.e., about one school in three) were offering a standard basic curriculum for all students alike. Of these schools, 22 were postgraduate institutions and the rest undergraduate faculties of medicine.

In the remaining two-thirds of the schools studied, the alternatives offered ranged from a basic curriculum combined with a choice of one or more elective courses to a curriculum entirely tailored to meet individual student needs. In many schools there was more than one comprehensive basic curriculum to choose from. The situation is summarized in Table 3.

TABLE 3. TYPES OF BASIC CURRICULA

Type of curricula	Number of schools offering curriculum
Standard curriculum only	39
With 1–9 stated elective courses	21
With 10 or more stated elective courses	12
With an unspecified number of elective courses	8
Alternative comprehensive basic curricula	25

The number of specific electives in a few schools was large, reaching in one instance 125. The 8 schools that did not specify the number of electives offered, referred to a " wide choice " or " any approved elective or core subject ". The alternative curricula offered by 25 schools usually incorporated a number of electives.

The main recent development has been an increase in the range of elective courses available in schools already offering electives 6 years ago. The number of schools adhering to a single standard curriculum has remained almost unchanged during this period.

A catalogue of electives offered by one or another school would comprise virtually every major course heading appearing in basic curricula. Usually, however, the number of electives offered is relatively small. In some cases two or more electives may be combined, and most of the subjects mentioned are also offered at advanced levels.

The proportion of course time allotted to electives varies so much that no generalization is possible. All that can be said is that, in schools offering a wide range of electives, an allocation of two-thirds of the total teaching time to core courses and one-third to elective courses is fairly typical.

In the selection of electives and the planning of training programmes for individuals, the general practice is for staff members to advise students on the basis of their job description, experience, and ability.

The introduction of new electives, to which continuing consideration is given in many schools, is decided in relation to such criteria as student demand and recognized career opportunities, governmental and other demands in relation to service needs and national planning, technical justification in the context of the school programme, and the availability of necessary teaching and other resources.

Other training programmes

Typically, schools of public health offer a varying number of training programmes in addition to the basic public health programme. Many provide opportunities for advanced specialist studies and supervised research experience leading to higher degrees. Such opportunities often assume the form of in-service training for junior members of the academic staff. The more advanced schools also make provision for specialist courses, usually of about 1–3 months' duration, in such subjects as health administration, health planning, research methodology, hospital administration, statistics, epidemiology, health education, malaria eradication, rural sanitation, and family planning. In addition, they offer general refresher courses and advanced training for senior health administrators and other health personnel. A few schools offer programmes that are international in character.

Not uncommonly, schools of public health are responsible for public health training programmes in the undergraduate medical school(s) of the parent university and in some places also for the public health programmes in faculties or schools of dentistry, veterinary medicine, pharmacy, social science, engineering, and midwifery. For some schools such programmes constitute a major teaching workload.

The range of training programmes leading to a primary diploma or degree (other than the DPH or its equivalent) is especially noteworthy in relation to the specialization now existing within the field of public health and the increasingly multidisciplinary nature of public health practice. Some 30–40 such programmes are cited in the 1973 Directory,[1] the computed total varying somewhat according to the classification and grouping adopted. In Table 4 the number of schools offering the programmes indicated is given for those offered by at least four schools. The less common programmes are listed at the foot of the table.

Some of the programmes offered are intended primarily for physicians whereas others are clearly intended mainly for nonmedically qualified health personnel or members of other professions.

[1] *World directory of schools of public health, 1971*, Geneva, World Health Organization, 1973.

TABLE 4. TRAINING PROGRAMMES (OTHER THAN THE BASIC PROGRAMME) LEADING TO A DIPLOMA OR DEGREE

Programme title	Number of schools offering programme
Public health nursing (health visitors training)	16
Hospital administration	15
Occupational (industrial) health	10
Public health inspector training (including special certificates)	9
Sanitary science for public health engineers	9
Nutrition and dietetics	8
Health education (diploma)	7
Paramedical social-health work	6
Tropical medicine and hygiene	6
Health statistics, nonmedical	5
Dental public health	5
Health planning	4
Epidemiology and virology	4
Medical microbiology (including Dip. Bact.)	4

Other less common programmes : public health and social administration ; nursing administration for health nursing supervisors ; maternal and child health ; family planning ; parasitology and entomology ; school health ; sports medicine ; public health clinical medicine ; occupational therapy ; medical records sciences ; international health ; psychiatric social work ; public health for pharmacists and biochemists ; public health for architects ; veterinary public health ; courses for laboratory technicians.

The question of courses for senior health administrators and other forms of continuing education for public health personnel, often provided at the request of ministries of health or other government departments, has assumed increasing importance in recent years and was the subject of the 1965 report of a WHO Study Group.[1] Such courses, though intended for persons without a qualification in medicine as well as for physicians, have hitherto been offered mainly for medically qualified persons with a postgraduate public health qualification. In these courses attention is devoted particularly to modern concepts of administration, health planning, and health practice, subjects in which older persons—men and women in their fifties or early sixties—find it more difficult to keep abreast of recent developments than in the more familiar scientific and public health fields. Typically, the courses are relatively unstructured and depend largely on exchanges of ideas and experience in guided discussions. As a rule their main purpose is to bring to the attention of participants the principles, applications, and limitations of formalized managerial, planning, and evaluation methods and the multidisciplinary character of health administration, rather than to attempt to inculcate new skills. This is so because for the most part it is sufficient that the senior administrator should be able to exercise an overall informed judgement in these newer areas, and

[1] *Wld Hlth Org. techn. Rep. Ser.*, 1965, No. 311.

above all that he should be able to select younger men skilled in using analytical methods and to ensure that they are used effectively.

Programmes to meet the special requirements of individuals are also offered. It must be said, however, that although the importance of continuing education for health personnel is widely recognized, an adequate range of courses to meet their diverse requirements is offered by only a few schools. In the majority of schools programmes of the kind referred to do not as yet exist.

In many of the training programmes referred to, the instructional resources of university departments, departments of government, research institutions, and, in a few instances, health services staff colleges are used in addition to the school's own resources.

Curriculum objectives

A striking and somewhat unexpected feature of the replies to the questionnaire was the completeness and explicitness with which curriculum objectives were stated, a fact confirmed by the consultant reports. Moreover, while in a few of the replies objectives were referred to only in terms of curriculum content, in some cases they were described in behavioural terms, i.e., in terms of the attitudes, knowledge, and skills the curriculum was intended to help the students to achieve, and their relations to actual and projected career requirements. It is fair to say, however, that objectives were stated as goals rather than as educational objectives in terms that would permit a comparison between what the curriculum was intended to achieve and its actual achievement. Although it is clear that substantial progress has been made towards the precise specification of educational objectives, there is still a very long way to go.

Curriculum formulation

As a matter of strict logic, the first step in the process of curriculum formulation should be the preparation of a statement of objectives. In practice, however, precise and agreed upon objectives often only become apparent as a result of discussions with governmental and other agencies as the curriculum begins to take shape.

Among the factors that have been mentioned as relevant in the first stage of curriculum formulation are:

(*a*) the health situation of the country or area;

(*b*) service needs and structure;

(*c*) task description of the posts to be filled by public health workers;

(*d*) the educational level and experience of prospective entering students;

(*e*) pre-existing training patterns;

(*f*) academic criteria and feasibility;

(*g*) the period of time to be made available for the training course and its general form, e.g., full-time or part-time.

Concurrently, or at a later stage, the results of academic confrontations with requirements such as priority needs and national manpower planning constraints are fed into the deliberations; and a consideration of salary scales, career structures, and career opportunities is also taken into account since there is virtually no private practice in public health.

In the final stages of curriculum formulation, allocations of time to courses and subjects, staffing premises, equipment, and administration are considered. The importance of these decisions needs no comment.

Review and revision of existing curricula

Though varying in matters of detail, the formal machinery for curriculum review follows much the same pattern in most schools and, with few exceptions, appears to be used effectively. The typical distribution of responsibility is more or less as follows:

1. The updating of curricula and minor course revisions not affecting the school programme as a whole or other departments are undertaken at the departental level and reported to the governing body of the school from time to time, usually once a year.

2. A standing committee of departmental heads (or their representatives) that meets at regular intervals or as convened by the dean or when otherwise requested is often responsible for overall continuing curriculum reviews and the preparation of proposals for approval by the school's governing body.

3. The ministry of health and other cognate ministries and the parent university are represented on the governing body of the school that approves major changes or the introduction of new courses.

4. Governmental and other bodies and university faculties are consulted as the need arises, but the extent of collaboration of this kind varies from school to school.

5. In some schools proposals for major changes in the curriculum require the approval of the faculty of medicine or the council of the parent university (on which the school or institute is represented).

In practice, informal discussions among staff members also play an essential part in the revision process, and in some schools the views of the student body are invited.

50

Generally speaking, most schools appear to think that the methods employed for reviews and revisions are adequate to ensure that curricula are kept up to date both technically and *vis-à-vis* the health situation and services, although in fact these mechanisms often fall short of what is required ideally. In a few schools, however, the view was expressed that the curriculum committees concentrated unduly on the allocation of teaching hours at the expense of more fundamental considerations. The solution, as mentioned elsewhere, is to make the competencies that the programme is intended to impart the starting point, and thereafter proceed to a consideration of its content and the number of hours required.

The opinion was also voiced that more effective interdepartmental collaboration was needed to eliminate avoidable overlapping in many areas of teaching and to strengthen the team approach to health problems.

The value of conferences of directors of schools of public health and of WHO seminars and publications in influencing trends of thinking and accelerating innovation in the development of curricula was commented on by a number of schools.

Duration of training programmes

It is seen from Table 5 that by far the commonest basic programme is a full-time programme lasting one year.

TABLE 5. NUMBER OF SCHOOLS OFFERING TRAINING PROGRAMMES (DPH/MPH OR EQUIVALENT) OF VARIOUS TYPES AND DURATIONS

Duration	Full-time	Part-time [a]	Total
One year	48		48
Two years	2	4	6
Three years or more	1	2	3
Total	51	6	57

[a] Programmes offered as either full-time or part-time are recorded here as part-time.

The full-time programme of two years' or more duration (given in three schools) comprises one year of core curriculum studies followed by a period of required in-service experience. The part-time programmes usually combine curriculum studies with required in-service experience, the commonest arrangement being attendance at the school for 2–3 days a week on release from employment in the health service. The usual reason for arrangements of this kind is that ministries of health and other employing authorities are not willing to release staff members for a year of full-time studies. It is also a convenient arrangement for certain private practitioners, such as paediatrician consultants, who wish to obtain a public health qualification.

The part-time programme of three or more years' duration comprises one year of formal studies followed by training in a specialty (MCH, occupational health).

Award titles

The award conferred by the majority of schools (or parent universities) is either a Diploma in Public Health (34) or a Master of Public Health (11), which as a rule are equivalent qualifications granted upon successful completion of one year of studies. In one or two instances, however, the degree of Master of Public Health is a higher qualification granted after the satisfaction of additional requirements, i.e., a further period of studies and the submission of a thesis.

The title of the award in a number of schools (6) is Certificate in Public Health or Licentiate of Public Health. In some instances, these awards are the equivalent of the Diploma in Public Health and comprise one year of studies with no provision for continuing basic studies. In these cases, the Master of Public Health is granted only after a further year of study.

Other schools (7) make no mention of an award or state either that they make no award or grant only a certificate of attendance or school diploma.

In the remaining schools, the titles of the awards include: Master of Science (Public Health) (2) awarded after two years of study; Doctor of Medicine in Community Health; Diploma of Social Medicine (2); Certificate of Public Health and Social Medicine; Diploma of Tropical Public Health; Certificate of Registration as Social Physician; Diploma of Hygiene and Public Medicine; and Licentiate of Public Health with mention of a specialty.

In a number of schools, the appellation DPH has been replaced by MPH on the grounds that the latter is a more prestigious title. Other schools wishing to take this step have been prevented from doing so because of restrictive university regulations.

In some institutes the DPH is awarded only to physicians, while in others nonmedical graduates are also eligible.

The final examination and other methods of evaluating student performance

It is not easy to generalize about the final examinations conducted in different schools. There are several schools that no longer hold a formal examination ; some schools, in which the final examination varies according to the courses taken; others, where no marking system is used (i.e., the results are determined by the verdict of a board of examiners); and at least

652

one, in which a final examination is required only for students whose progress has been unsatisfactory.

It is, however, clear from Table 6 that a formal examination that is partly written and partly oral is still the rule and that in many schools there is still a practical examination. There is also a clinical examination in infectious diseases in a number of schools. The table also shows that the majority of schools still depend exclusively on the traditional essay-type paper in the written examination, although a considerable number have introduced multiple choice questions into this part of the examination. In a few schools multiple choice questions constitute the entire written examination.

TABLE 6. NUMBER OF SCHOOLS USING VARIOUS EXAMINATION METHODS AND THEIR AVERAGE PERCENTAGE WEIGHT (ALL SCHOOLS) IN DETERMINING STUDENT MARKS

Type of examination	Number of schools using method	Average % weight
Oral	45	31
Written, essay-type	41	46
Written, multiple-choice type	18	35
Practical	29	28
Dissertation	29	24

The average weights given to oral, written, and practical parts of the examination, as shown in Table 6, conceal wide differences between one school and another. In some schools, for example, up to 90% of the mark is decided by the written examination, while in other schools, as already mentioned, there is no written examination at all ; or again, the dissertation is given considerable weight in some schools and disregarded so far as marks are concerned in others.

The following approximate allocation of marks can, however, be regarded as fairly typical : written examination, 50% ; oral examination, 25% ; dissertation and practical examination, 25% (multiple-choice questions, when used accounting for some 50% of the total written examination marks).

The examination procedure in one school is quoted as an illustration of current thinking about methods of student evaluation :

> " The traditional written essay-type paper has been abandoned. Students are required to complete each course satisfactorily. Departmental heads may set papers but they depend mainly on oral tests, practical work and exercise performance. Assessment is also made of project reports and theses. Finally, students appear before three separate boards of examiners for an interrogatory. They are usually advised in advance of

353

the topics to be discussed with them. They may be given a take-home exercise to complete and submit at the discussions."

The practice of appointing external examiners is fairly common but by no means universal. Papers are usually set by the school's academic staff, often with the assistance of the external examiner(s), and in some instances they are subject to the approval of the parent university as the examining board.

Evaluations before the final examination

In all but 9 schools the performance of students is assessed as the course proceeds. The methods employed are broadly of three kinds:

(*a*) continuous assessment of student performance in class exercises, seminars, group discussions, presentations, laboratory work, field and other assignments;

(*b*) reports of syndicates or workshops and periodic progress reports;

(*c*) semester examinations or examinations at the completion of courses or parts thereof, including in some instances practical work and set exercises.

Almost invariably, account is taken of these interim assessments in deciding the results of the final examination (where it exists). In a few schools these methods of assessment have entirely replaced the formal examination at the end of the course.

Course evaluation

Only 4 schools reported that they made no provision for the appraisal of teaching programmes and courses, and 2 of these were schools established so recently that the question had not yet arisen. A number of the schools reporting that they undertook programme evaluations did not give details. The methods used in the remaining schools are summarized in Table 7,

TABLE 7. COURSE AND PROGRAMME EVALUATION METHODS

Method	Number of schools employing method
1. By soliciting student opinion during or at termination of course	54
2. By conducting follow-up inquiries or reviews in one or more of the following ways:	35
(a) student opinion solicited after an interval of years (by questionnaire or interview)	22
(b) studies of the subsequent courses of students	26
(c) employer opinion solicited	15
(d) analysis of student performance in more advanced studies	11

which shows at a glance that the most frequent method of appraisal is to solicit the views of present or former students, often in conjunction with other methods.

By far the commonest method of obtaining student opinion is through departmental staff interviews and discussions with individual students or groups, in some schools seminars being set aside at the end of the course for this purpose. In a number of schools such formal methods are complemented by systematic questionnaires completed by students at the termination of the course, or after an interval of years in the case of follow-up inquiries. Their purpose is to obtain student opinion on (*a*) standard of presentations; (*b*) level of presentations; (*c*) interest in subject; and (*d*) felt value of subject; and to provide an opportunity for proposing revisions, additions, or deletions.

It is recognized that student assessment is not necessarily sufficient grounds for making changes in content or methods of presentation, but it does indicate where reviews might be needed. It can, for example, suggest that a workshop or seminar might be substituted for a formal presentation, or that the purpose of teaching some particular topic needs to be explained to ensure that its value to the student is apparent.

It is also recognized that student assessments, which are in effect consumer reactions, need to be supplemented by continuing staff evaluations of programmes. These are made in a few schools by such procedures as rotations of course directors and by having staff observers sit in on lectures and seminars.

Longitudinal studies made by comparing assessments at the termination of a training programme with assessments made 2–5 years later have proved to be especially useful for judging the felt value of different courses.

There is little evidence of systematic attempts to assess the value of teaching programmes in relation to future work needs and demands, but in most schools this objective is met to some extent by making studies of the subsequent careers of students, soliciting the opinions of employing authorities, and ensuring ministry of health representation on curriculum committees.

Nonphysicians in the basic course

Some half to two-thirds of the schools of public health studied admit members of professions other than medicine to the basic public health course alongside physicians.[1] The nonphysicians usually admitted include sanitary engineers, veterinarians, dentists, statisticians, behavioural scientists, public health chemists, microbiologists, and graduate nurses. Their

[1] A few schools also offer separate basic training programmes for nonphysicians, usually leading to an MSc or comparable degree.

55

numbers are ordinarily small but they account for as many as one-third of the entrants in some schools. A usual condition of admission for the nonphysician is the possession of a primary or graduate degree in a discipline relevant to public health conferred by an acceptable institution. It is reported that the interaction among students with different professional backgrounds in the basic programme enlarges the outlook of everyone involved and helps to promote a multidisciplinary team approach. It is also particularly valuable for those students who will assume responsibility for the organization and direction of health personnel training later in their careers.

On the other hand, a mixed professional group in the basic training programme creates formidable teaching problems. The nurse, for example, rarely has the scientific background or mathematical competence needed for biostatistics and some aspects of environmental hygiene, while the sanitary engineer, who rarely has any difficulty with these subjects, is ill-versed in the biological sciences and usually knows nothing of human anatomy and physiology. Such deficiencies have to be remedied by appropriate orientation courses and special intensive tuition. In at least one school the nonphysician, who is accepted only under special circumstances, is required to pursue a full year of preparatory studies before joining the basic programme.

In some countries where the basic course is conducted in English but the national language is an additional problem is raised by the fact that certain non-physician students, e.g., agriculturalists and nurses, speak only the national language.

Uncertainties about the service demand for nonmedical personnel possessing a DPH/MPH add to the difficulty in some schools of deciding whether nonphysicians should be admitted to the basic course.

II. SCHOOLS OF PUBLIC HEALTH

Distribution, size, and output

As of 1971 there were approximately 121 schools of public health in the world. They have mostly been established in the present century. If a distinction is made between postgraduate institutions and schools that are primarily undergraduate medical schools offering basic postgraduate public health training, of the 61 schools established in recent years (since 1942) 45 are in the first category and 16 in the second (i.e., a ratio of almost 3 : 1).

The distribution of schools of public health in the world is very uneven. Table 8 confirms that they are mainly concentrated in Europe and the Americas, where over three-quarters of the world's schools are located. Eight of the 13 schools in the South-East Asian Region of WHO are in

056

India, leaving only 19 for the rest of the world, with Africa south of the Sahara almost unprovided for. Table 8 also shows that of the schools established during the last 20 years (1952–1971) only 3 are located outside Europe, the Americas, and India. (See, however, footnote to Table 8.)

TABLE 8. DISTRIBUTION OF SCHOOLS IN THE 6 WHO REGIONS (1971)

WHO Region	All schools	Schools established 1952–1971
AFRO	1	1 (Uganda)
AMRO	27	4
EMRO	5	1 (Iran)
EURO	71	11
SEARO	11	4 (India (3), Burma (1))
WPRO	6	
Total	121	21[a]

[a] Eighteen Italian schools and certain others are not included in this total because, though cited for the first time in the 1973 Directory, they were not in fact new schools.

The postgraduate schools are variously known as schools or institutes of public health, hygiene, community medicine, preventive medicine, tropical medicine, public health and tropical medicine, hygiene and tropical medicine. The titles tropical institute, graduate school of social medicine, laboratory of social medicine, national teaching unit, and high institute of public health are also used. The designations of departments of medical schools and colleges offering postgraduate public health training are no less diverse. They include departments of public health, hygiene and social medicine, social and preventive medicine, epidemiology and preventive medicine, social medicine and public health, and social and occupational health.

As to the size of schools, at one end of the sacle there are large institutions offering a wide range of programmes and engaged in extensive research, often with well equipped laboratories and other services, a full-time faculty of 100 or more, and an annual budget running into millions of dollars, while at the other extreme there are schools offering only a postgraduate programme in public health for a small number of students.

The number of student places for the basic postgraduate training programme in these schools ranges from 2 to 570, the range for the majority of schools being 15–49. In 10 schools the number of places exceeds 100, and in 32 schools it is less than 15.

The singular character of medical education in the Union of Soviet Socialist Republics is a useful reminder that even in arraying schools by size there is no guarantee that like is being compared with like. In the USSR there are three distinct streams of medical education for training

057

respectively " therapeutists ", " paediatricians ", and " hygiene specialists ". Consequently, as students enrolled for higher training in public health are drawn from the third group, they are already committed to public health careers when they graduate and have already had much of the training that would usually be postgraduate in other places. Thus, " basic " postgraduate public health training in the USSR is actually " advanced " training. It is undertaken in institutions for the higher training of physicians in all specialities including public health. These self-governing state institutes are among the largest schools included in the 100+ range.

It is not possible from the information available to make an exact estimate of the number of students who obtain a general postgraduate public health qualification each year, but a round figure of 4000 is probably near the mark. In comparison, there are some 913 undergraduate medical schools in the world (excluding China and certain other countries) whose output is of the order of 75 000 doctors a year. Thus, in the world as a whole, about one doctor in 20 now proceeds to a general postgraduate qualification in public health. There are of course wide variations between different countries and regions.

Not every student who obtains a basic postgraduate public health qualification adopts a public health career. Some return to clinical practice, others enter the armed forces, and a number are from professions other than medicine. On the other hand, over and above those who obtain a general public health qualification, a substantial number of doctors proceed to a specialist qualification in subjects such as occupational health, MCH, and statistics. Complete data for these latter groups are not available, but in round numbers probably 4–5% of all doctors now make their careers in some branch of public health.

The government of schools of public health

As has been mentioned, about one-third of the schools of public health are departments of undergraduate medical schools or colleges offering a basic postgraduate programme in public health and in some cases also courses for sanitary inspectors and other nonmedical health personnel. These schools, while in some instances enjoying a considerable measure of autonomy, are administered by the governing body of the medical school, usually a university faculty, of which they are a part.

The situation of the postgraduate schools and institutes is less uniform. Some are relatively autonomous units within a parent university. Others are governmental schools administered by the ministry of health and/or the ministry of education. Some are affiliated with a research institute, others are independent or private institutions, and a few are military colleges primarily within the jurisdiction of a government department of defence. Almost unexceptionally, however, they are in close relationship

with government departments responsible for operational health services.

Although in the early years after their establishment some schools were independent of a university, there are few mature schools that are not now either within or affiliated with a university.

Typically, the governing body of the school is responsible for its administration, including the formulation of training programmes and curriculum proposals, subject as a rule to an overriding control by the university authority in matters of policy, budget, academic appointments, and degree requirements. Proposals for new courses and substantial curriculum changes are commonly subject to review and approval by the university authority. The ministry of health, and not uncommonly ministries of education, planning, labour, and social security, are represented on the governing body.

Whatever their detailed character, such arrangements are usually sufficient to ensure that high academic standards are maintained and that the courses offered and levels of student intake are kept in fair alignment with service requirements and career structures.

Research activities in relation to public health training

Few schools of public health are not engaged in research both independently of their teaching responsibilities and associated with them. Typically, the larger schools undertake research studies at many levels and in many fields. In some instances these are investigations into health problems referred to them by government departments and often undertaken in collaboration with a ministry of health or national research institution. Others originate in the school itself either on the initiative of individual staff members or departments or as part of a school programme.

The wide range of research undertaken includes in particular investigations in epidemiology, health statistics, environmental sanitation, environmental physiology, and occupational health, often based on a combination of laboratory and field work. It is noteworthy that still only a few schools have limited research programmes in the field of mental health. A more recent development is the pursuit of investigations under the heading of health practice research, whose broad purposes are to improve the efficiency and effectiveness of health services and to provide data for rational decision making and the planning of services. These are studies of a practical or evaluative character, such as investigations into disease prevalence, operations research, work studies, and studies of service utilization and other social medical problems. Some of the more advanced schools also engage in rigorous research into the validity of the investigational methods and techniques and their development for use in the field. Many of the research programmes and projects, especially those relating to organizational and

managerial problems, medical records systems, epidemiological questions, and controlled trials, are carried out mainly through or in association with field training centres, health centres, hospitals, and other institutions. They are commonly of a multidisciplinary character.

It goes without saying that active participation in research of one kind or another by public health school departments and individual teachers is indispensable for the long-term maintenance of academic standards. Ongoing research also has an important contribution to make to training programmes both at the basic postgraduate level and at more advanced levels.

The current research work of teachers is a useful source of teaching examples and facilitates the demonstration of the scientific method in action. In one school, which has the responsibility for research into the control of parasitic infections, it was pointed out that the activities involved enabled teachers to present an up-to-date account of these diseases and the related services as well as to provide illustrations of programmes and of survey, control, and evaluation methods.

Students in the basic health course cannot, of course, be expected to carry out major research projects, but their involvement in an actual investigation is feasible and can be used to develop their skill in research methods. In particular, participation in epidemiological and operational investigations is virtually essential for developing the managerial skills and approaches that are now accepted as a necessary part of the basic training of public health officers.

Although the present report is devoted mainly to basic training, it is recalled once more that schools of public health are also responsible for the in-service training of research workers and teachers, many of whom at some stage are proceeding to higher degrees. For these groups the supervised research project is an essential element of their advanced training and is necessarily undertaken within the framework of the school's research activities. It should also be mentioned that some schools provide research facilities for social scientists and other nonmedical workers, and in some instances they contribute to the advanced training of selected clinicians in health practice research.

Less definitive but no less important are the academic benefits that schools derive from visiting teachers and research workers, including short-term attachments, which in no small measure depend on the research prestige of the institution.

The inquiry yielded little new information on the service functions of schools of public health, functions that are often closely related to research activities. The general impression was that, although many of the larger schools are committed to substantial service activities, there is a tendency for some to be shed and for others to differ in character from those of an earlier period. Many of the bacteriological, serological, and chemical

analysis services commonly associated in the past with the larger schools, for instance, have now been transferred in many countries to state laboratories and other institutions, while certain aspects of service research in such areas as health service utilization, field epidemiology, and occupational health undertaken by schools of public health have expanded in both quantity and scope.

Field experience and personal health care in the community

There is general agreement that postgraduate public health students need supervised field experience and exposure, as observers or participants, to a wide range of health care services. This requirement is usually met, at least in part, by experience obtained while serving in various branches of a health service either before or during the period of postgraduate public health studies. It is, however, also accepted by most schools of public health that the basic training programme should provide field experience, including the operation of medical care services. The view was expressed at the recent Conference of Directors of Schools of Public Health [1] that such a provision should be regarded as a minimum requirement of every school.

It is common knowledge that broadly speaking, the arrangements made by schools of public health in this regard are of two kinds : [2]

(*a*) visits of observation or supervised participation by students in a variety of operational health services, by arrangement with the responsible authorities ;

[1] *Wld Hlth Org. techn. Rep. Ser.*, 1967, No. 351, p. 15.

[2] Yet another approach that may merit wider attention has recently been devised in one country. For some time the adequacy of the existing basic training (DPH) as a foundation for public health practice has been questioned in the United Kingdom. In the view of some, the situation could be remedied by updating the DPH curriculum and supplementing it with later advanced courses in management and planning. Another school of thought favoured recruiting doctors with some years of clinical experience but without a public health qualification and giving them specialist training mainly in administration and the social services. However, neither of these solutions has been adopted. Instead, it is now proposed that the basic training in public health—hitherto provided by schools of public health—should be replaced by a three-year period of in-service experience in the national health service punctuated by a number of short release courses in such subjects as the social sciences, statistics, epidemiology, and management science. A new qualification, Member of the Faculty of Community Medicine of the Royal College of Physicians, obtainable by examination after completion of the prescribed training, is to replace the DPH. What is especially noteworthy here is that schools of public health in the United Kingdom will no longer be responsible for the basic public health training of physicians, and, moreover, that the release courses proposed in the new training will not be offered exclusively by schools of public health. These courses, each lasting four weeks or so, will be given by university departments, schools of business administration, and other institutions in different parts of the country selected for their eminence in a particular field.

69

(*b*) Short-term attachments of students to health centres, during which time they take part in the routine activities of the centre and also often undertake case studies and participate in research projects.

In some instances the school has full control of the rural or urban health centre used for teaching and demonstration purposes, including responsibility for the provision of professional staff for its day-to-day work. In other cases the school does no more than make arrangements for the attachment of students to a centre that is staffed and controlled by an operational health authority. In either event the need for further field experience in areas such as hospital services, regional health services, and occupational health is not excluded.

The case for having health centres associated with schools of public health rests partly on curriculum objectives and partly on general academic and research requirements.

With the increasing attention given to specific prophylaxis, health promotion, and personal health surveillance, personal health care is no longer regarded as synonymous with medical care of the sick. During the last decade or so especially, an enlarged concept of care in the community and medical care services outside hospitals has been widely accepted; the inclusion of a social element in diagnosis and treatment has become a reality in many places; general practitioners, and especially doctors engaged in health centre practice, work increasingly in groups and in association with social workers and other paramedical personnel; the practising physician now spends much of his time as the director of a health care team. These developments have implications for all basic postgraduate public health training, notwithstanding the fact that they vary in degree with the organizational structure of health services and the level of service development in the country. In the developing countries many doctors in the public health service work in health centres, where in addition to clinical duties they have charge of other centre functions such as day-to-day sanitary and disease control, MCH, local health statistical records, and health education. In the developed countries, on the other hand, the public health physician is usually more concerned with the organization and management of systems of health care services than with clinical practice and the internal direction of primary health care facilities. Yet both types of physician need an adequate knowledge of health care organization and practice, although the range and character of the clinical and managerial skills they require are clearly different. Since, however, a proportion of the public health physicians in developing countries who early in their career engage in health centre work are later promoted to senior administrative positions, there is a good case for including both supervised experience of health centre practice and a wider experience of personal health care service administration in all training programmes, subject only to a difference of

62

emphasis to meet varying needs. A period of supervised practice in a health centre is clearly valuable in meeting these requirements.

The advantages of a health centre that is a part of a school, or under its control, are fairly obvious. In many countries the only way to ensure standards of practice adequate for teaching requirements is for the school to assume full responsibility for managing the centre. Also, participation in the work of the centre by physicians and other members of the school's academic staff is a valuable way of fortifying teaching programmes and of enabling epidemiological and organization research, field trials, and similar projects to be undertaken effectively. In a number of schools the incidence of disease in the catchment area and other aspects of the teaching centre's work are reviewed at periodic meetings attended by school and centre staff and students. One purpose of such reviews is to demonstrate how the regular clinical work of a health centre can furnish records that serve as a basis for epidemiological surveillance and health programmes in the catchment area. Health status, the prevalence of noncommunicable diseases, the identification of high-risk groups, and the detection of infectious diseases are included in continuing studies that could not as a rule be undertaken in a centre outside the school's control.

It has been argued that a health centre conforming to academic standards may be misleading to students because it is unrepresentative of prevailing health care practice. This view, though not without substance, can be discounted on the grounds that the purpose of health centre experience during the basic training programme is to make the student aware of the standard that health centres *should* attain—to demonstrate, as it were, a feasible ideal. The gap that exists between the teaching centre and the average health centre is readily brought to the students' attention by visits of observation to other centres.

Annex 2

AN OUTLINE OF EDUCATIONAL PLANNING AS RELATED TO POSTGRADUATE PUBLIC HEALTH PROGRAMMES

The needs of students

While it would be desirable to provide public health workers with the broadest possible range of knowledge and skills, limitations of time and resources usually dictate that educational plans should aim at a more limited set of competences.

Consequently, the first step in the planning process is to develop a data base that will help planners to decide which training needs require primary emphasis. These data should be drawn from a variety of sources, including:

(*a*) job analyses and analyses of the actual performance of various categories of public health workers;

(*b*) consultations and interviews with public health practitioners, supervisors, and teaching staff who are familiar with local health care problems;

(*c*) demographic and epidemiological studies to document the type and frequency of health care problems, analyses of health care delivery systems, and health development plans pertinent to the country or region in which the student will work after graduation;

(*d*) analysis of the student's prior training and experience and his performance in entrance examinations.

Educational objectives

The next step in educational planning is to translate these needs into task descriptions and then into terms that enable the student to understand the knowkedge and skills he must acquire in the course of training. The format that has been found to be most useful in communicating objectives to students (as well as to their instructors) is one that expresses the goals in terms of student behaviour at the end of the educational process, i.e., what the student will be able to do by the end of his training that he was not able to do before, setting specific competences that are both observable and measurable. For example, to state as an educational goal that the student will "understand biostatistical procedures" is not as useful as stating that "when presented with multiple sets of data, the student will select those data that can be analysed by parametric statistical procedures". While time-consuming and often frustrating, the definition of educational objectives in these terms has such critical importance that curriculum experts advise spending 50% of all planning time on this step. As will be discussed later, objectives formulated in this fashion facilitate decision making about methods of instruction and course content. They also simplify evaluation by clarifying what must be evaluated.

Whatever sources they are derived from and however they are selected, it is helpful to classify educational objectives under three broad headings: knowledge (cognitive), manual and verbal skills (psychomotor), and attitudes (affective).

Further categorization within these three headings or domains is also useful. One method of classifying objectives in the cognitive domain is

according to the complexity of the intellectual activity required of the student. At the lowest level is recall of information. At a higher level of complexity there is the interpretation of data, and at the highest level problem solving. Other classification schemes exist for the cognitive domain as well as for the affective and psychomotor domains that serve the same purpose, i.e., to assist in the design of instructional and evaluation strategies. This process of categorization also helps to ensure that important complex intellectual, attitudinal, and psychomotor objectives are not omitted from the long list of more easily defined simple cognitive objectives.

Learning experiences

Learning experiences are defined as student activities that result in learning. They vary from experiences whose conditions are created by the instructor (e.g., listening to a lecture) to experiences created and controlled by the student (e.g., self-directed library research on a difficult public health problem). Regardless of the type of experience, there are fundamental principles and conditions that have been demonstrated to increase the effectiveness of any learning activity. Two important conditions are (*a*) that the student should have the opportunity to use new knowledge or practise skills until he reaches an acceptable level of competence, and (*b*) that he should receive feedback about the extent to which his performance is successful or unsuccessful, including the reasons underlying such judgements.

In addition to satisfying these two conditions, learning activities should be consistent with those principles upon which most learning theorists agree. For example:

1. Learning under self-motivation is preferable to learning under motivation imposed by external sources, e.g., by teacher or school.

2. Reward is usually a better stimulus to learning than is the fear of punishment or failure.

3. Overly intense motivation (especially motivation stemming from fear and anxiety) may be accompanied by distracting emotional states and may thus be less effective than moderate motivation for learning certain kinds of tasks, especially those involving difficult discriminations.

4. Students who have experienced success in the past are more willing to set higher goals for the future. They will also be willing to work harder to achieve these goals if they fail (without receiving punishment) in their initial attempts.

5. Emotion as well as intellect is involved in the learning process. Consequently, the personality of the student may hamper or enhance his ability to learn from a given teacher.

1065

6. Active participation in a learning activity is preferable to passive receipt of what someone else has learned. The learning experience should be organized so as to maximize the active participation of students in the teaching-learning process and to give them the necessary motivation to continue their studies after graduation.

7. The student will be able to apply knowledge to the solution of new problems more efficiently if he is given experience of applying it in a variety of situations during the learning process. Knowledge will also be more useful if it is acquired in a situation similar to that in which it will be applied.

Another critical principle of learning is that a method of instruction designed to facilitate the attainment of certain educational objectives may not be effective in the case of others. It is essential that the selection of an instructional method be based upon its ability to facilitate the achievement of a specific type of objective and not on the teacher's personal preference. For example, the lecture method possesses documented effectiveness for helping students to acquire information. However, it has limited, if any, value in inculcating problem-solving skills and often hinders rather than helps the changing of values or attitudes. On the other hand, small group instruction, while less efficient in transmitting facts, has been shown to be more effective in achieving psychomotor and attitudinal objectives.

Other instructional methods that have the potential for achieving important complex educational objectives in public health include:

1. Simulation exercises, in which students are presented with standardized learning experiences through the use of appropriately trained actors or staff members, or by means of computers or pencil-and-paper instruments that incorporate responses and simulate problem situations. This method allows students to collect data and define problem-solving strategies and to receive feedback on errors.

2. Role playing, in which students assume the roles of a variety of personnel discussing a common public health problem, e.g., a high level governmental meeting is enacted with students assuming the roles of Minister of Health, Minister of Education, etc. A critique of the role playing usually generates considerable insight into the problems of such a situation and is particularly useful for the achievement of attitudinal as well as cognitive goals.

3. Case reports, which are detailed analyses of actual public health problems, e.g., of a regional epidemic of smallpox, calling for literature research and an explanation for success or failure in dealing with the problem. They provide students with opportunities to collect and interpret data and assess problem-solving strategies. Attitudinal objectives may also be achieved if the case chosen reflects certain values, for example, an epidemic that has occurred as a result of poor cooperation among members

of the public health team. It is important that, besides relying on extensive exchange of case material among schools, each school should develop its own pool of cases drawn from local material.

4. Contract teaching, a type of learning experience in which the instructor and student(s) negotiate a written contract that specifies (*a*) the educational objectives to be achieved, (*b*) the learning strategies to be employed, and (*c*) the criteria and means by which student performance will be evaluated. Contract teaching facilitates the attainment of complex objectives and provides the student with an opportunity to assume responsibility for his own education. Such responsibility is traditionally considered as the hallmark of the professional.

It is essential to organize teaching in such a manner as to make it possible for the student to integrate the knowledge he is acquiring. Teaching of the basic subjects can be coordinated during programme planning through communication among the teaching staff on how to avoid duplication and to orient individual objectives towards the common goal. Over and above coordinated planning of the teaching programme, it is possible to arrange its various stages so that each subject complements the others.

Integration may also be needed at a deeper level in schools of public health. A student upon graduation cannot be expected to take a broad, integrated view of the health field and to consider health demands in all their contexts and relationships if his experience in school has been limited to a few individual subjects, such as maternal and child health, hospital administration, etc. It would similarly be unreasonnable to expect a graduate to see in proper perspective the numerous competing claims on limited health resources if in his own school he has witnessed isolation of, and competition among, departments and disciplines. Public health workers will be members of teams and must not only have a broad and integrated outlook on health but must think in terms of other specialities, such as social sciences, economics, and management science. In other words, the curriculum of a school of public health must concurrently serve the conflicting needs for specialization, on the one hand, and comprehensiveness and integration, on the other. This could be achieved by offering a wholly integrated curriculum, the first part of which (perhaps representing half the courses) would be devoted to problem solving: first, the methods of defining society's health needs and problems would be discussed, then the resources and activities suitable for solving the defined problems, and finally the methods used in managing the problem-solving process, including planning and evaluation. The various disciplines, instead of providing isolated explanations of their own subjects, should each contribute to the discussion of these topics in order to help the students acquire an integrated, multidisciplinary, problem-oriented way of thinking; that is, the teaching should involve all disciplines in a process concentrating on problem finding,

problem solving, and management of problem solving. The second part of the curriculum might then consist of elective courses, field practice and research activity, and independent study under the guidance of a tutor. This part would promote self-instruction, independent thinking, and some specialization.

In addition, students must be provided with interdisciplinary field practice oriented towards a holistic study of the health problems of a community and towards the elaboration of programmes to solve these problems. In this type of field work students from different specialities should participate—physicians, dentists, nurses, engineers, veterinarians, pharmacists, sociologists, statisticians, etc.—under permanent supervision of the teachers of the school.

It is recommended that every member of the teaching staff should participate in teaching courses outside his own specialty, as this will facilitate his own—and the students'—understanding of public health as a whole and avoid overemphasis on any one subject. This goal can be achieved in a number of ways. In one school of public health, excellent results have been obtained through the use of polyvalent teachers, each having one specialty, while all of them—under the guidance of course coordinators—form teams responsible for the planning, development, and control of various joint courses.

Finally, it should be emphasized that the amount of time devoted to learning must be the amount of time needed to achieve the set objectives. Since, because of differing aptitudes and backgrounds, students learn at different rates, educational programmes with a fixed duration, e.g., one year, necessarily treat time as a constant and competence as a variable. If schools of public health are to serve their community and students most effectively they must offer programmes in which competence is the constant and time the variable.

Evaluation

The chief problem in evaluation is *what* to evaluate. To some extent this issue is resolved at the time when educational objectives are specified in terms of observable and measurable behavioural criteria. This preliminary step is probably the single most important one in the evaluation of any educational programme, since all the evaluator then need do is measure to what extent those objectives were achieved.

For example, it would be generally agreed that an important goal of public health training is that the students should be able to "appreciate" the contribution that can be made by various members of the public health team. However, it is impossible to determine if this goal has been reached until one establishes what kinds of behaviour would indicate "appreciation" and determines whether the student in fact exhibits such behaviour,

e.g., whether he can describe the ways in which the epidemiologist, biostatistician, etc., can contribute to solving public health problems and, more specifically, whether he actually requests their assistance when confronted with these problems. While it is probably true that such behaviour cannot be wholly equated with " appreciation ", failure to behave in this way might reasonably be interpreted to indicate a lack of appreciation of the value of the other members of the team.

Other components of the educational process also need evaluation. The teaching methods used, the curriculum, the learning experiences provided, and the performance of both staff members and graduates should be systematically evaluated in terms of the school's own stated mission and the course objectives. It is particularly necessary to assess how well graduates are meeting the specific needs of the community they serve. The results of such assessments will then lead to a periodic review of the school's objectives, curricula, and learning experiences. Data must be sought regarding the appropriateness of the teaching method for the goals involved, the teachers' effectiveness in promoting learning, and—a point of critical importance—the degree to which the student's achievement of the set objectives facilitates or improves his performance as a public health worker in the field. This latter information is essential for the updating of objectives and consequently of the curriculum and is the only way to ensure that an educational programme will remain responsive to the ever-changing public health needs of the country or region.

It is also important for programme planners to decide *when* to evaluate. Ultimately, it will be necessary to determine whether the student has acquired sufficient competence to progress to the next level of training or function independently as a public health worker. This is called summative evaluation. However, evaluation should not be relegated to the end of a course of instruction. Checks on learning should also be planned to take place at regular, frequent intervals during instruction so that errors and their causes can be identified and corrected as soon as they occur. It is this systematic collection of data about progress, called formative evaluation, that provides the feedback necessary to guide both the student's and the teacher's activities. But the wise planner will recognize that the data generated by formative evaluations are for guidance only. If there is any suspicion that they will be used for grading or promotion then students will not feel free to exhibit their ignorance in order to learn but will instead try to conceal it so as to avoid judgement.

As regards *how* to evaluate, once again the methods chosen must be appropriate for the objectives. There is no instrument that measures all things well. Multiple choice examinations have been proved to be reliable and valid for measuring recall of information, and if well constructed they can assess problem-solving ability. However, they are of no value in measuring attitudes. Alternatively, rating scales, check lists, and the semantic differ-

69

ential scale permit a reliable assessment of skills, performance, and behaviour reflective of desired attitudes. A comprehensive review of test instruments relevant to the education of health professionals has been published by WHO.[1]

Annex 3

THE PROBLEM–DISCIPLINE MATRIX

The customary form of organization in academic settings is based on " departments ". Such an organizational structure might be defined as an assemblage of cognate disciplines within a faculty. If this structure is too rigid, interdisciplinary cooperation and communication are often impeded. Yet such cooperation is sometimes essential. Community health, for example, can be taught and studied either in terms of problems or in terms of disciplines. When approached in the former way, the problems are

EXAMPLE OF A PROBLEM–DISCIPLINE MATRIX[a]

Disciplines	Problem-oriented teaching–research programmes					
	health services	urban health	population studies	environmental health	international health	disease control
Administrative sciences	Dr X Mrs H	Mr N	Miss O Dr E Mrs M	Dr M	Mr R Dr Y*	Dr C
Behavioural sciences	Miss A	Dr V Mr M	Mrs L Dr S	Mr P* Dr K	Miss U	Dr M* Mr D
Biological and physical sciences	Dr B Dr G Mr A	Mrs T*	Miss D Dr C	Dr F Mrs D	Dr L Dr S	Dr W Mr H
Biometry	Mr J	Miss J	Dr T*	Miss Q Mr C	Dr A Mrs T	Mrs S Miss V
Epidemiology	Miss S Dr W* Miss E	Dr R Mr E	Mr B Miss Z	Dr K Mrs A	Dr F Miss M	Dr Q

[a] Staff members' names are inserted as appropriate in the cells of the matrix. Module conveners are indicated by asterisks, discipline conveners are underlined.

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[1] Charvat, J., McGuire, C. & Parsons, V. (1968) *A review of the nature and uses of examinations in medical education*, Geneva, World Health Organization (*Publ. Hlth Pap.*, No. 36).

70

best stated and solved by the combined efforts of persons from a number of different disciplines. The organizational structure of a school or faculty should thus facilitate rather than impede such collaboration if it is intended that sets of problems should constitute a significant subsystem within the total system of the teaching programme.

The matrix structure shown above is one way of organizing staff resources so as to promote interdisciplinary collaboration in problem-oriented teaching and research. In this structure each staff member is identified with a problem-oriented group, called a module, as well as with his professional discipline. Although there is no formal hierarchical structure to the modules and disciplines, the staff member designated as the "convener" can call the group together.

71

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